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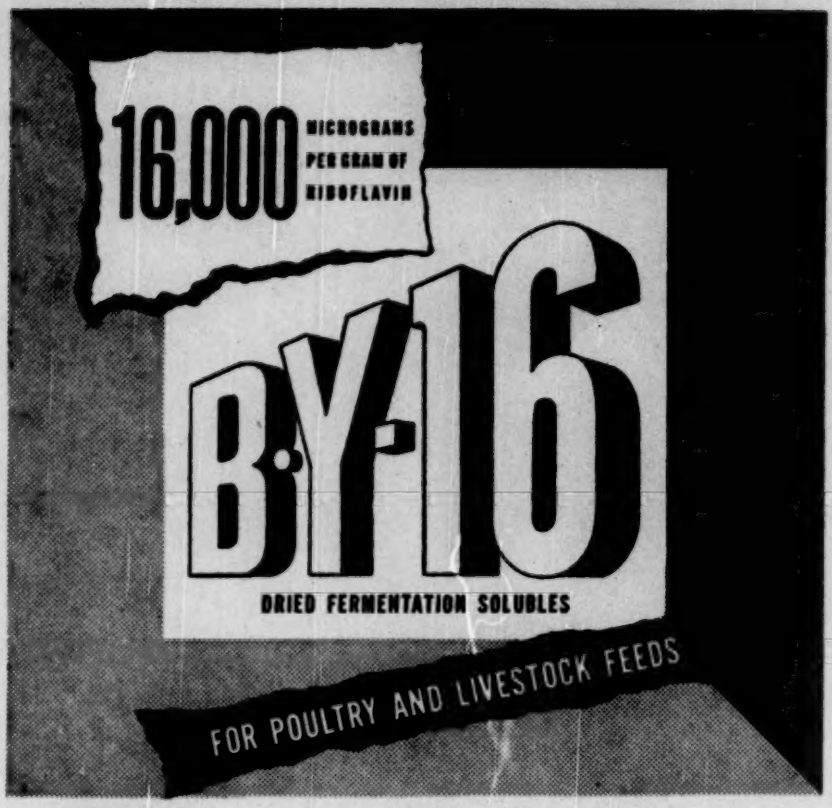

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WORLD'S POULTRY SCIENCE JOURNAL

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NINTH WORLD'S POULTRY CONGRESS

SPECIAL REPORT

from

W. D. Termohlen, President, World's Poultry Science Association
Major Ian MacDougal, Secretary, World's Poultry Science Association

May 26, 1950

This report is being written in Paris where your President and Secretary have spent one week working with Mr. Alex Wiltzer, President of the Committee for the Ninth World's Poultry Congress, Mr. Waroquiez, Secretary-General of the Congress, various members of the Congress committee and the French Ministry of Agriculture.

We are pleased to report that in recent weeks much progress has been made and we can in this report briefly unfold an outline of the plans.

The Congress will be opened in a large assembly hall in the Sorbonne by the Minister of Agriculture. This hall will accommodate over 2000 people. The Congress itself will be held in the Grand Palais, a very magnificent building, centrally located and capable of handling exhibits and many meetings. It is planned to have five sectional meetings in which during the Congress 100 papers will be presented. Five general papers will be presented at the plenary session on subjects of vital interest to the members of the poultry industry. A live-bird exhibit and a commercial material exhibit are to be held on an international basis. Several interesting and colorful social events are to be scheduled. Tours to points of interest will be operated daily, and a series of post-congress tours are to be available for those interested in such group visitations.

From the plans presented to us we believe an interesting and very valuable Congress is promised for August 2-9, 1951.

In the next month it is expected the Provisional Announcement will be published and ready for distribution. Formal invitations from the French Government to the various governments of the world are expected to be issued within the next ten days.

Your officers urge that the association members in each country immediately take steps to organize a National Committee for the Congress and begin plans for a maximum participation in the Congress. Report the organizations of such committees to Major Ian MacDougall, Secretary World's Poultry Science Association, 5 Chandos Street, London W.1, England.

Left to right: Mr. P. Waroquiez, *Secretary-General*, 9th World's Poultry Congress; Mr. W. D. Termohlen, *President*, World's Poultry Science Association; Mr. Alex Wiltzer, *President*, 9th World's Poultry Congress; Major Ian MacDougall, *Secretary*, World's Poultry Science Association.

MESSAGE FROM PRESIDENT W. D. TERMOHLEN TO THE MEMBERS OF THE WORLD'S POULTRY SCIENCE ASSOCIATION

The Ninth World's Poultry Congress, which is to be held in Paris, France, August 2-9, 1951, is a topic of discussion by poultry people all over the world. Your President has had frequent communication with Mr. Alex Wiltzer, a Vice-President of the Association and the President of the French Executive Committee for the Ninth World's Poultry Congress. This is being written the first day of May, and tomorrow, May 2, I sail from New York City for England, where conferences will be held with Major Ian Macdougall, who on July 1 becomes Secretary and Assistant Treasurer of your Association. Dr. G. F. Heuser on that date becomes Treasurer and Assistant Secretary and continues his office of Editor of the Journal. This change in designation of Officers complies with the new Constitution, follows a recommendation made by the Council at the Copenhagen meeting, and has just been approved by the Council. From England, and accompanied by Major Macdougall, I will visit France. There your two Officers

will confer and advise with Mr. Wiltzer and his Committee regarding the organization and plans for the Ninth Congress. It is expected that by early summer the French Committee will issue a Preliminary Announcemet regarding the Congress. So that you may receive information concerning Congress plans and details, it is suggested you write to one of the following, requesting that a copy of the Preliminary Announcement be sent to you: Mr. Alex Wiltzer, President, French Executive Committee for the Ninth World's Poultry Congress, 28 Rue Bonaparte, Paris 6, France. Mr. P. Waroquiez, Secretary-General, Ninth World's Poultry Congress, 12 due d'Armaille, Paris 17, France.

Members of the Association in each country should now proceed to develop a National Committee for the Ninth World's Poultry Congress. Messrs. Wiltzer and Waroquiez and Dr. Heuser should be notified of the appointment of such Committee. This Committee in each country should assume the following responsibilities:

(1) Encourage participation in and attendance to the Ninth Congress.
(2) Encourage membership in the Congress.
(3) Plan for travel and tours to the Congress.
(4) Submit proposals for Papers to be presented at the Congress. (See item in this issue of the Journal titled, "Papers for Ninth World's Poultry Congress.")
(5) Publicize the Congress throughout the country.
(6) Obtain new members to the World's Poultry Science Association.

The poultry industry is one of basic importance in virtually every country of the world. Therefore, I hope there will be large attendance from all parts of the world. Under the leadership of the French National Executive Committee, we are assured of a noteworthy gathering for the exchange of data and information on our world-wide industry.

Among the greatest benefits of a World's Poultry Congress is the stimulation of interest in world poultry affairs and the promotion of friendly relations and better understanding among the poultry people of the world.

The influence of the Ninth Congress in 1951 and the future will depend upon the number of persons who attend and actively participate.

Permit me, in my capacity as President of the World's Poultry Science Association, to encourage every member to

attend the Ninth Congress if he or she can possibly do so. Also, may I urge every World's Poultry Science Member to talk up the Congress and encourage other poultry people to attend. I feel sure the Congress will be an outstanding success and that its effects will be of great benefit to our world-wide industry.

PAPERS FOR NINTH WORLD'S POULTRY CONGRESS

W. D. TERMOHLEN

It is none too early for Members of the World's Poultry Science Association to begin making plans regarding Papers to be presented before the Scientific Sessions of the Ninth World's Poultry Congress.

At the Eighth World's Poultry Congress held in Copenhagen, Denmark in 1948, the Council of the Association made a motion that a Committee be appointed to make recommendations on presentation of Papers at the next Congress. This Committee, under the chairmanship of Dr. R. Coles of England, has made its report and it has received approval by the Members of Council. Following are the recommendations:

(a) The National Congress Committee in each country, where one is set up, should receive Papers and decide whether or not to accept them for submission to the French Committee. In this connection and in order to maintain a high standard in the Papers submitted, the National Committee should appoint subcommittees from experts in the several fields to examine all Papers before they are allowed to go forward for acceptance.

(b) It should be open for any person to submit Papers to be read at the Congress whether or not they are Members of the Association.

(c) Any person submitting a Paper should indicate whether or not he will be attending the Congress. In accepting Papers, priority of acceptance should be given to those for which the authorship will be present unless the Paper is of unusual quality and outstanding in facts or findings reported.

(d) If the author is not to be present to read his Paper, only someone closely associated with his work from the same research center, institute, or firm, and nominated by the author, should be allowed to read the Paper. In no case should someone not familiar with the work read the Paper at length or in the form of a resume.

(e) If the author is present he should have the choice of reading his Paper at length or, if he prefers, giving a brief resume and speaking on it over a limited period of time.

(f) Authors from countries which do not have a National Committee should submit their application to present a Paper and copies of their Paper directly to the French National Committee.

The French Executive Committee for the Ninth World's Poultry Congress will soon issue a Preliminary Announcement in which requirements as to length of Papers, date of application to present Papers, and final date for submission of Papers, will be outlined.

As a suggested guide which may be helpful, and based on past Congresses, we list the following:

The average length of Papers should be approximately 1,500 words and probably should not exceed 2,000 words.

Each Paper should be accompanied by a resume (summary) not to exceed 300 words.

Papers should be submitted in any one of the official languages. (Official languages will be announced in the Preliminary Announcement by the French Committee and in later issues of the Journal).

Pictures, drawings, graphs or charts should be kept within moderate limits. It should be borne in mind that provision will undoubtedly be made for the showing of slides at the Scientific Sessions.

National Committees should be set up in every country where possible. These Committees should have as one of their responsibilities the submitting, to the French Committee, of proposals for the presentation of Papers from their respective countries. If no National Committee has been organized in a country, then, Members of the Association should submit their own proposal directly to the French Committee to Mr. P. Waroquiez, Secretary-General, Ninth World's Poultry Congress, 12 rue d'Armaille, Paris 17, France. Proposals for each

Paper should include the name or names of authors, subject of the Paper, a brief indication of the scope of the Paper, whether or not the person submitting the Paper will attend the Congress and if not, who closely associated with him will attend to present the Paper.

Proposals to present Papers should probably be in the hands of the French Committee not later than January 1, 1951. Final submission dates for Papers will probably be not later than April 1, 1951.

Since each Member of the Congress, in all probability, will be presented, at the time of registering, with a copy of the Proceedings containing the Papers, many authors will find it highly desirable to present the summary or resume and permit a full period for discussion.

Since the number of Papers will probably be limited to around 100 to 120 Papers, it will be to the advantage of those desiring to present Papers to submit their proposal at an early date.

PRESIDENT'S MESSAGE CONCERNING THE 10TH WORLD'S POULTRY CONGRESS

Fellow Members of the World's Poultry Science Association:

A notice to the Members of the World's Poultry Science Association that your President and Officers will be interested between now and January 1, 1951 in receiving an invitation from any country which is interested in serving as host for the 10th World's Poultry Congress which will be held in 1954.

Article XII of the Constitution reads as follows: World's Poultry Congresses. (1) World's Poultry Congresses shall be held every 3 years. (2) The President or his designated representative shall be empowered to approach countries with a view to obtaining an invitation for the succeeding Congress. If more than one invitation is in prospect the Secretary shall canvass the Council with a view to obtain the order in which the countries shall be approached. Negotiations will immediately be opened with the Government of the country receiving the greatest number of votes. Should the response be unfavorable the other countries receiving the next numbers of votes are to be approachced in rotation. Negotiations shall be completed with one country before any other is approached.

Since it is highly desirable that a decision be made in regard to the 10th World's Poultry Congress at the next regular meeting of the World's Poultry Science Association which will be held at the time of the 9th Congress in Paris, France during August of 1951, it is obvious that negotiations should start in early 1951. So that your Officers can properly serve the Association, I urge Members of the Association in any country where there is definite interest in holding the 10th World's Poultry Congress to immediately begin making contacts with proper governmental officials and urge that an expression of interest and a desire to serve as host for the 10th Congress be sent at an early date to your President. In the way of review, may I call to your attention that up to and including 1948 the Congresses have been held as follows:

First—The Hague, Netherlands 1921
Second—Barcelona, Spain 1924
Third—Ottawa, Canada 1927
Fourth—London, England 1930
Fifth—Rome, Italy 1933
Sixth—Leipzig, Germany 1936
Seventh—Cleveland, Ohio, United States 1939
Eighth—Copenhagen, Denmark 1948

and the next Congress:
Ninth—Paris, France 1951

It is suggested above that before Members of the Association express an interest to your Officers in the holding of the 10th Congress, that they make some contacts with proper governmental officials. Experience has taught your Officers that unless there is some interest on the part of the proper governmental officials there would probably be much wasted effort on the part of the Members of the Association and your Officers giving consideration to any expressions of interest unless there is real possibility of governmental backing for such an invitation. We would, therefore, appreciate that any expression of interest and desire on the part of the Members of the Association in any country be accompanied by a letter of interest from a proper governmental official. The Minister of Agriculture of a country would certainly be considered as a proper governmental official as would also an expression from the head of the poultry work of a Ministry of Agriculture. It is also to be suggested that any expression of interest should be accompanied by a statement from the Officers of Poultry Organizations and Associations of the country which is send-

ing the invitation. Your President will report in early January to the Members of Council any invitations received and will list the countries in the order in which the invitations have been received. Your President suggests early activity on the part of interested groups. Invitations for consideration as host country for the 10th World's Poultry Congress should be addressed to your President as follows: W. D. Termohlen, President, World's Poultry Science Association, 6638—32nd Place, N.W., Washington 15, D. C. (USA).

SILVER PHEASANT HEN AND DOMESTIC COCK HYBRIDS OBTAINED BY MEANS OF ARTIFICIAL INSEMINATION.

M. J. H. MARCHLEWSKI
University of Cracow, Poland

During the spring of 1948 two silver pheasant hens were inseminated with sperm of the domestic cock of the Polish Greenleg race. The number of eggs laid after inseminations was 27. Two of them were broken accidentally. From the remaining 25 eggs, eight embryos died in the early stages of development, one died on the sixth and one on the tenth day of development. One hybrid hatched on the 21st day of incubation and was reared until adult.

In the spring of 1949 three Silver Pheasant hens were inseminated with White Leghorn sperm. Six out of the 17 eggs which were laid after inseminations were broken. Eleven eggs were incubated, and three proved to be fertile. Two embryos died in the early stages of development, and one died on the 23rd day of incubation.

All dead embryos examined anatomically or histologically proved to be females. The adult hybrid is also female, but till the end of the first year of life has shown no sexual activity. The colour of the plumage of the adult hybrid shows somewhat intermediate features of both parents, whilst the structure of the body is rather inherited from the pheasants, with the exception of the skinny appendages of the head, the colour of the feet and the shape of the tail feathers.

TABLE POULTRY EXPERIMENTS

E. HADLINGTON and J. H. GULLIFORD
Hawkesbury Agricultural College, N. S. Wales, Autsralia

In order to compare the cost of rearing Australorps and White Leghorns to a marketable age of twelve to sixteen weeks, and also to compare the battery system of rearing with ordinary methods, an experiment was carried out last year at Hawkesbury Agricultural College. The experiment commenced on 27th August, 1948, with 800 sexed day-old cockerels (400 Australorps and 400 White Leghorns) and concluded on 17th December, when the birds were sixteen weeks old.

The results showed that although there was no appreciable difference in the cost of feeding by the two systems, and in the return over cost of feeding in the case of White Leghorns, there was a decided advantage in favour of ordinary raising methods in return over feeding cost in the case of Australorps.

THE PROCEDURE ADOPTED

The 800 sexed day-old cockerels were randomised into two groups (A. and B.), each group consisting of eight lots. They were then treated as follows:

Group A.—Ordinary Methods of Rearing

(1) 400 day-old cockerels (200 Australorps and 200 White Leghorns) were apportioned, in lots of fifty, to eight sections of a hot water circulating brooder, four lots of each breed.

(2) Transferred at 6 weeks old to weaning pens, in lots of fifty less mortalities (four lots of each breed).

(3) Transferred at 12 weeks old to single colony sheds (again in the same lots).

Group B.—Battery System of Rearing

(1) 400 day-old cockerels (200 Australorps and 200 White Leghorns) were placed, in lots of fifty, in eight sections of an electric battery brooder (four lots of each breed).

(2) Transferred to unheated cockerel batteries (24 inches by 27 inches by 24 inches) at 6 weeks old. The birds were divided into equal numbers as nearly as possible, but not more than ten were placed in each compartment. By this means the separate identity of each lot was maintained. The actual number of birds in each compartment varied from seven to ten.

THE METHOD OF FEEDING

The chickens were fasted for 36 hours after hatching, and then throughout the remainder of the experiment were

fed on an "all mash" ration consisting of:

White meal	34 lb.
Pollard	20 lb.
Bran	15 lb.
Ground oats	10 lb.
Meat meal (48% protein)	15 lb.
Whey powder	5 lb.
Salt	1 lb.
Total	100 lb.

Plus Vitamin A and D Oil

No green feed was given throughout the experiment, but a vitaminised oil containing both vitamin A and vitamin D was added to the mash in the usual proportions. The feed was mixed weekly to ensure that the potency of the vitamin oil was maintained.

THE RESULTS OBTAINED

WEIGHT OF BIRDS

Group weighings were made at 4, 8 12 and 16 weeks, and individual weighings at 6, 12 and 16 weeks.

The average weights per birds in the different groups at four weekly periods are shown in Table I.

TABLE I

Weight of Birds

Age	White Leghorns		Australorps	
	Group A (Ordinary Methods).	Group B (Battery System).	Group A (Ordinary Methods).	Group B (Battery System).
	lb.	lb.	lb.	lb.
4 weeks	0.54	0.50	0.46	0.48
8 weeks	1.51	1.43	1.49	1.31
12 weeks	2.68	2.82	2.93	2.81
16 weeks	3.53	3.60	4.14	3.96

Growth of White Leghorns at 12 weeks of age in Group B (battery system) was somewhat greater than that of White Leghorns in Group A (ordinary methods), but at 16 weeks the difference was practically negligible. The Australorps showed slightly better growth in Group A (ordinary methods) right through the experiment.

RETURN OVER FEED COST

At 12 and 16 weeks of age an estimate was made of the market value of the birds at the rate of 1s. 10d. per lb. live weight, being the price paid under commercial conditions at the time for cockerels. The cost of feeding was assessed on the basis of £14 per ton.

The figures for the return over cost of feeding are shown in Table 2.

TABLE II

Cost of Food, Market Value of Birds and Return over Feed Cost

	White Leghorns			
	Group A (Ordinary Methods).		Group B (Battery System).	
	12 weeks	16 weeks	12 weeks	16 weeks
	s. d.	s. d.	s. d.	s. d.
Cost of food per bird	1 4.8	2 3.2	1 7.4	2 7.2
Value per bird	4 11	6 5.7	5 2	6 7.2
Return over cost of feed	3 6.2	4 3.4	3 6.6	4 0

	Australorps			
	Group A (Ordinary Methods).		Group B (Battery System).	
	12 weeks	16 weeks	12 weeks	16 weeks
Cost of food per bird	1 5.2	2 4.3	1 8.0	2 10.1
Value per bird	5 4.5	7 7	5 1.8	7 3.1
Return over cost of feed	3 11.2	5 1.9	3 .58	4 5.1

FOOD CONSUMPTION

Food consumption for the different groups at four-weekly intervals is shown in Table 3. The weights shown are for 100 birds and are based on actual food consumption for each group.

TABLE III

Weight of Food Consumed per 100 Birds

Period.	White Leghorns		Australorps	
	Group A (Ordinary Methods).	Group B (Battery System).	Group A (Ordinary Methods).	Group B (Battery System).
	lb.	lb.	lb.	lb.
1- 4 weeks	128	141	113	122
5- 8 weeks	350	390	350	381
9-12 weeks	521	628	566	691
13-16 weeks	576	699	660	836
1-16 weeks	1,575	1,858	1,689	2,030

It will be noted that the food consumption of Australorps was greater than White Leghorns from 9 weeks onwards in both groups. Over the 16 weeks period Australorps consumed 114 lb. per 100 birds more than White Leghorns in Group A (ordinary methods) and 172 lb. per 100 birds in Group B (battery system). In both breeds food consumption in Group B (battery system) was greater than in Group A (ordinary methods).

RELATION OF FOOD CONSUMPTION TO GAIN IN BODY WEIGHT

The relationship between food consumption and gain in body weight is shown in Table 4.

TABLE IV

Relationship of Food Consumption to Gain in Body Weight

Age	Body weight per 100 Birds		*Weight Gain (lb.) per lb. of Food Consumed	
	Group A (Ordinary Methods).	Group B (Battery System).	Group A (Ordinary Methods).	Group B (Battery System).
	lb.	lb.	lb.	lb.
	White Leghorns			
1- 4 weeks	54.4	50.6	0.363	0.302
5- 8 weeks	151.2	143.1	0.277	0.237
9-12 weeks	271.9	284.4	0.232	0.225
13-16 weeks	354.4	360.0	0.143	0.108
1-16 weeks			0.220	0.189
	Australorps			
1- 4 weeks	46.9	48.1	0.344	0.329
5- 8 weeks	148.8	130.6	0.291	0.217
9-12 weeks	291.9	280.6	0.253	0.217
13-16 weeks	413.7	395.0	0.185	0.137
1-16 weeks			0.240	0.191

* Weight of day-old chickens was taken as 8 lb. per 100.

The greater food consumption of White Leghorns in Group B (battery system) corresponds with a slightly greater body weight gain. Body weight gain per pound of food consumption to 16 weeks was 0.22 lb. for Group A (ordinary methods) as against 0.19 lb. for Group B (battery system).

Food consumption for Australorps was greater in Group B (battery system) and weight gain less than Group A (ordinary methods). Body weight gains per lb. of food consumption to 16 weeks was 0.24 lb. for Group A (ordinary methods) and 0.19 lb. for Group B (battery system).

Comparison of the gain in body weight and amount of food consumed, as shown in Table 4, indicates that disposal at 12 weeks old is likely to be more profitable than disposal at 16 weeks.

CONDITION OF BIRDS

During the weighing of the birds at 12 weeks of age cases of breast blisters were noted amongst the Australorps in Group B (battery system). There was no indication of this condition in the White Leghorns in this group at 12 weeks of age, or in either breeds in Group A (ordinary methods). However, at 16 weeks of age approximately 35 per cent. of the White Leghorns and 84 per cent. of Australorps in Group B (battery system) were affected, whilst in Group A (ordinary methods) only 4.5 per cent. Australorps and no White Leghorns showed this condition.

BACK INJURIES

All the birds, both Australorps and White Leghorns, in Group B (battery system) were nervous and took fright at the slightest provocation. This resulted in a large proportion of Australorps being scratched and torn on the back. This condition gradually developed, and was very pronounced between 12 and 16 weeks of age. This trouble was not evident amongst the White Leghorns, which was probably due to the heavier feathering of this breed.

SUMMARY OF RESULTS

In this experiment there was very little difference between the cost of feeding Australorps and White Leghorns, either at 12 or 16 weeks of age, nor was there any appreciable difference in the cost of feeding by the two systems of rearing.

After 12 weeks of age the gain in body weight per lb. of food consumed was greatly reduced in both breeds, and this was more evident in Group B (battery system) than in Group A (ordinary methods), and in White Leghorns than in Australorps in both groups.

The return over cost of feed was about equal for White Leghorns in both systems at both 12 and 16 weeks, but Australorps in Group A (ordinary methods) showed a decided advantage over those in Group B at both 12 and 16 weeks.

The high incidence of breast blisters in Group B (battery system) compared with Group A (ordinary methods), was probably due mainly to the nervous condition of the birds, which resulted in injury to the breast bone.

POULTRY RAISING IN HAWAII

C. M. BICE
University of Hawaii, Honolulu, T. H.

Hawaii is famous for Waikiki Beach, hula girls, grass shacks, and Pearl Harbor of 1941. It's the land of ukelele and romance. More than 2,100 miles of water separate Hawaii from the Pacific coast. Mark Twain, while on a visit here remarked, "These Islands are as beautiful as any gem set in any ocean."

The islands' poultry industry, however, is not so well known as their beauty. Early records indiciate that Captain James Cooke, the English explorer, found poultry at Waimea on the Island of Kauai when he landed there in 1778. He bartered with the natives for chickens, pigs, and vegetables in return for nails and chisels. This transaction marks the beginning of the poultry industry in Hawaii.

I came to the Hawaiian Islands in 1927. At that time, most of the pullets used for egg production were imported from the Pacific coast states at about 4 months of age. Upon arrival, they suffered from fowl pox and infectious cold. Mortality in local hatched baby chicks was as high as 50 percent.

Now the picture has changed. New management practices adopted by all commercial producers enable them to produce and develop pullets that compare favorably with Mainland importation. Only a few producers, who are interested in new blood lines, import pullets.

EXPANSION IN THE INDUSTRY

Growing from a small beginning, Hawaii's poultry industry now has 227,900 adult birds and 125,400 birds from 6 weeks to 6 months of age.

Hawaii's poultrymen are primarily interested in producing eggs for the Honolulu market. Consumers seem to have no preference in egg color. One finds white and brown eggs in the same carton at retail stores.

Tourists riding on well-paved roads throughout all the Islands find poultry farms along the main highways and on smaller roads leading from the highway. Most of the poultrymen they see feeding their flocks are Japanese. A few are Haoles (whites).

Japanese-Americans find the poultry industry suited to their temperaments and family life. Most poultry farms in

Hawaii range from 1 to 3 acres and are conducted as a family enterprise. The average family takes care of 750 to 2,500 laying hens. A few farms carry from 10,000 to 14,000 layers and employ some outside labor.

Hawaii's farms are small, because land here is limited and expensive. Many poultrymen lease land while others buy outright. On the present market, an acre costs from $750 to $4,000 or more, depending on the distance from the Honolulu market. Land rentals range from $25 to $150 per acre.

Poultry is produced on all the inhabited Islands, but Honolulu is the only large market. Producers on the neighbor Islands ship their surplus eggs and poultry to the Honolulu market by plane and steamer.

One might expect that in Hawaii's semi-tropic climate, all the poultry would roost in coconut trees, poinciana trees, and hibiscus bushes. Instead the birds are housed in up-to-date open air poultry units.

Pullets in their first-year production are housed in individual laying batteries except those retained for breeding. Most birds are marketed after the first year of lay.

Hawaii's poultry producers have found that the individual laying battery prevents cannibalism and makes culling automatic. Mortality is lower because diseases are more readily recognized and treatment more promptly administered.

The outdoor laying batteries are constructed so they may be placed in a large shed-type building with open sides. Some have their own roofs and are placed in the open. All brooder houses are mosquito-proof as fowl pox attacks baby chicks at an early age.

REDS AND HAMPS POPULAR

Rhode Island Reds, New Hampshires, Leghorns, and crossbreds are found on Hawaiian poultry farms. In general, Reds and New Hampshires are most popular. Most local consumers show a decided preference for dark colored birds and will pay a premium for Rhode Island Red or New Hampshire meat birds.

Many Filipinos keep fighting game cocks in small units that are practically dark inside. Filipinos are especially fond of Cuban fighting games and in the back-yards of certain producers, Japanese Shamo games are also found.

Cock fighting is against the law in the Territory, and local newspapers now and then report police raids on cock fights in sugar cane fields. Filipino men greatly outnumber

women on Hawaii's plantations. Many of these men say that their fighting cocks boost their morale and give them companionship and relaxation after the day's work in the sugar and pineapple fields.

CLIMATE SUITABLE FOR POULTRY

The climate of the Hawaiian Islands is semi-tropic. Temperatures seldom rise above 85 degrees or fall below 46 degrees F. Rainfall in many localities, especially on the windward side of the Islands, is relatively high. Many dry sections, on the other hand, have less than 15 inches of rain per year. Mt. Waialeale, on the Island of Kauai, is one of the wettest spots in the world. It has more than 500 inches of rain per year.

Poultry do well where the rainfall ranges from 45 to 100 inches per year. Egg production is high and the growth of bird normal in these areas because it is possible to maintain high feed consumption at all times. Hawaii's climate varies little from month to month throughout the year. Trees are in leaf the year round.

FEEDING PRACTICES

Commercial feed manufacturers have played a major role in the development of our local poultry industry. Hawaii depends on the Mainland for its poultry feeds because land suitable for growing grain is scarce and expensive. Ready-mixed poultry feeds are imported in large quantities. Imported ingredients are also mixed by local feed manufacturers.

Research in poultry nutrition conducted by commercial enterprises and the Hawaii Experiment Station at the University of Hawaii, College of Agriculture, has contributed much toward more rapid growth in young stock and lower mortality in both young and adult stock, increased egg production and higher hatchability.

A typical poultry farm in Hawaii

Shipping strikes have a disastrous effect on the poultry industry. As this article is being written, a shipping strike has depleted feed stocks so seriously that many poultrymen are killing hundreds of growing and laying birds. Such a condition involves great risks to Hawaii's poultry industry.

The Territory of Hawaii does not participate in the National Poultry Improvement Plan because the Territory was not included in the act that set up the plan on the Mainland. Consequently, Hawaii poultrymen lack incentive to go ahead on a large-scale breeding program. There are few hatcheries with a capacity of 65,000 eggs. Many of the chicks brooded in Hawaii come from hatching eggs and baby chicks imported from the Mainland.

Although poultry producers in the Territory have not participated in the National Poultry Improvement Plan, the Extension Service of the University of Hawaii, College of Agriculture, has carried out a local pullorum disease program over the past few years. This program has resulted in lowering the death rate from pullorum disease to a fraction of 1 percent on those farms participating in the local plan.

Chicks are placed in open-air growing units immediately after they are vaccinated against fowl pox. This is usually done when they are 4-8 weeks old, although on some farms it is necessary to vaccinate day-old chicks. On commercial farms, all chicks are raised in confinement. Only a few backyard flocks are found on the ground.

DISEASE CONTROL

In Hawaii's sub-tropical climate where the temperature remains fairly constant throughout the year and the humidity is relatively high, poultry parasites multiply rapidly. Because of this situation, all chicks and adult stock are raised on wire floors. Sulfa drugs are used extensively in the control of coccidiosis and coryza. Pullorum testing is practiced by all interested in a breeding program.

As stated earlier, chicks are vaccinated at an early stage to control fowl pox, and measures are taken to control Newcastle disease which was discovered in the Territory about two years ago.

Because birds are raised in close confinement, it is necessary to be on the alert for cannibalism. This vice has been controlled by debeaking and the use of individual batteries.

Honolulu, the only large city in the Territory of Hawaii, serves as the market for the Island of Oahu and the neighbor

Islands. The Board of Agriculture and Forestry has set up market regulations for eggs comparable to the regulations in effect on the Mainland. Eggs are graded according to size and quality and are packaged in either one-dozen cartons or 30-dozen egg cases.

Most of the poultry meat finds its way to the Honolulu market and is sold as New York dressed. However, the practice of eviscerating birds prior to marketing is growing. Many poultry producers are also packaging all poultry in transparent market bags. This new practice will, no doubt, be well accepted by consumers.

EDUCATIONAL FACILITIES

The College of Agriculture at the University has three departments . . . research, extension, and classroom instruction. The Experiment Station carries on research in poultry nutrition, breeding, and management. The Extension Service disseminates this information to poultry producers in the field. The instructional staff presents courses in elementary poultry production, advanced poultry production, and research. Sixty-three students were enrolled in the freshmen course this past year, indicating considerable student interest in poultry husbandry.

Turkey, duck, and squab production is of relatively minor importance in Hawaii. (Pacific Poultryman, Redlands, California, November, 1949.)

RESEARCH RESULTS BENEFIT POULTRYMEN

Herewith are given the results of two research and one demonstration project carried on by the poultry department of Pennsylvania State College.

CAREFUL PLANNING REDUCES LABOR IN CARING FOR LAYERS

Records of labor requirements in caring for poultry flocks on 12 farms taken by Prof. G. O. Bressler showed that removing partitions from large houses resulted in profitable reductions in time spent in feeding and egg gathering on all farms where the change was made. Careful feeder arrangement was found to be very important in saving steps in doing chores.

Feeding mash with a mechanical feeder eliminated all labor in doing this job except that associated with filling the hopper.

Feed boxes located on the floor under chutes required less time and less walking for filling than conventional hoppers. The installation of a feed track in a house 110 feet long was not profitable on the basis of time saved. As a means of making the work easier, however, it was particularly advantageous.

Installation of automatic water fountains in pens formerly serviced manually resulted in more reduction in time and distance traveled than any other change on any of the farms. Grouping nests near the entrance of doors of pens saved considerable time and travel. Little time was required to make such changes, and they were paid for in a relatively short time by the labor saved.

Nesting rooms were not as satisfactory as nests grouped on open walls at the ends of pens because the hens did not utilize them. Brown eggs required substantially less time than white eggs for cleaning, grading, and packing for market.

None of the labor-saving methods affected egg production or livability of layers adversely.

TIMES OF HATCH AND MATURITY AFFECT TURKEY MARKET QUALITY

Turkeys consume maximum amounts of feed just prior to marketing. Keeping turkeys beyond the age of maximum finish reduces profits to growers. Feathering conditions, always a standard used for determining market quality, was found by Prof. P. H. Margolf to be related to time of hatch and season of year when the birds matured.

Beginning March 8, groups of approximately 300 White Holland turkey poults were hatched at 8-week intervals throughout the year. All were reared in confinement and fed according to the 1948 Penn State Routine Brooding Management schedule for turkeys.

Feed consumption and body weights were recorded at 8, 16, 24, 26, 28, 30, and 32 weeks of age. At 16 weeks the poults were sexed, after which the males and females were housed and fed separately. Approximately 20 per cent of the males and females were killed, dressed, and drawn at biweekly intervals beginning when the turkeys were 24 weeks of age.

The feathering of the males and females was observed at slaughtering and the numbers of immature main tail and flight feathers were recorded. Live, New York dressed, and drawn weights were taken. All birds were graded according to official U. S. grades and standards for dressed turkeys.

Females had adequate market finish at 28 weeks and the males at 32 weeks of age when reared under all conditions of this experiment. Feathering condition was much better on female turkeys from the June-hatched birds at 28 weeks than from turkeys of the same sex hatched in March, May, and June.

No turkeys from the March, May, and June hatches showed evidence of reproductive development at 32 weeks of age. Some of the birds from the August hatch showed evidence of reproductive development in March when the birds were killed and dressed at 28 weeks of age. Development of sexual maturity before the hens are 28 weeks old or the toms 32 weeks of age may adversely affect market quality of turkeys.

VITAMIN A FROM FISH OIL MUCH NEEDED BY YOUNG TURKEY POULTS

Inclusion of vitamin A from fish oil in turkey starting feeds at the rate of about 1000 U.S.P. units per pound (in addition to the carotene normally present) would give added protection from vitamin A deficiency during the nutritionally critical early weeks of life, Dr. R. V. Boucher and Prof. E. W. Callenbach have shown.

When fed to turkey poults in repeated trials on the basis of equal U.S.P. unitage, crystalline beta-carotene was less effective than vitamin A both in promoting growth and in storage of vitamin A in the liver. Crystalline vitamin A acetate and Black Cod liver oil were used as sources of vitamin A.

From 5 to 20 weeks of age, at levels of intake above maintenance requirements, vitamin A acetate resulted in about 20 times higher liver storage than was secured with beta-carotene. Supplementation with Black Cod liver oil resulted in storage at intermediate levels. Blood plasma levels of vitamin A were consistently higher in poults that received vitamin A acetate than in those that received beta-carotene.

The vitamin A potency of the diet influenced the vitamin A content of both the liver and blood plasma. A relationship was found to exist between the vitamin A content of the liver and that of the blood plasma. Even after four weeks on a vitamin A-free diet the vitamin A in the blood plasma was still influenced by the store that remained in the liver. Inefficient utilization of carotene was indicated by the increased proportion of carotene excreted in the feces as the carotene intake increased.—M. A. Jull.

THE NEW QUALITY BRAND FOR EGGS IN GERMANY

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The sorting of eggs into commercial classes and stamping them with a quality mark is not of such primary importance in Germany as in countries in which the surplus eggs are shipped to foreign markets. However, even in Germany a quality mark was necessary in order for the domestic product to meet the quality of imported goods and by means of the quality stamp to promote the consumption of domestic eggs. Up to the year 1934, obtaining permission to mark eggs was optional so that the consumer, when buying eggs, was able to choose marked or unmarked domestic eggs as well as foreign eggs.

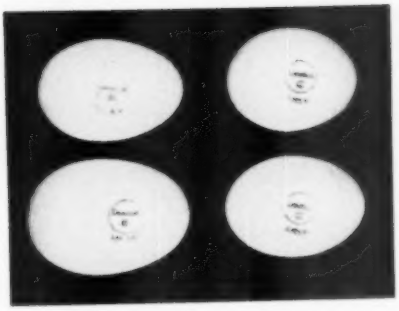
In 1934 it was ordered that, except for the eggs which are delivered directly from the producer to the consumer, all eggs which are brought into the trade must be marked. This marking followed on the basis of sorting.

1. According to 2 quality classes
   a) Strictly fresh (air cell height not over 5 mm.)
   b) Fresh eggs (air cell height from 5-10 mm.)
2. By five weight classes
   "S"—65 grams and over
   "A"—60-65 grams—ave. weight 62-63 grams
   "B"—53-60 grams—ave. weight 57-58 grams
   "C"—50-53 grams—ave. weight 52-53 grams
   "D"—45-50 grams—ave. weight 47-48 grams

In addition to the mark for these "fresh eggs" which corresponds to the quality requirement of commercial classes, there were the following 3 marks:

"Sorted" (for all underweight eggs and eggs that still could be used for human consumption)
"K" (for cold storage eggs)
"Preserved" (for water glass eggs)

During the war, the egg marking had to be discontinued because the regular delivery of the eggs by the producer was not possible because of the lack of fuel and vehicles. In the year 1948, a new marking regulation was issued and again with the provision that all eggs which go into the trade are to be marked, however, with the difference in regard to sorting that a simplification was introduced so that there is only one quality class, namely "fresh eggs" (air cell not over 10



mm.), while the five weight classes were taken over from the old order.

A lively exchange of opinion is under way in regard to this form of standardization. The producers desire, without exception, the permission for a producer's mark (name of farm) in addition to the commercial class mark and a great many of them desire the return to a voluntary form of marking, because they discover in an overall marking, a dangerous monopoly of the egg dealers. Also, the consumers speak against the entire marking order because the price rise which is linked with it extends in the same way to all eggs. Producers and consumers as well as dealers advocate the introduction of only three weight classes in order to obtain a simplification.

NEWCASTLE DISEASE APPEARS IN BELGIUM

Newcastle disease in Belgium appeared during January on a poultry farm in East Flanders and is spreading seriously through much of the country. It is believed in the majority of cases that the germs of the disease are carried to poultry farms principally by crows, magpies, woodpigeons and also, by infected products and baskets brought to these farms. There is almost total mortality.

Poultry farmers have been told to refrain from purchasing poultry and eggs for hatching of unknown origin, as well as feed in sacks which may have been contaminated. As soon as the first symptoms of the disease appear, the farmer or owner of poultry is compelled to slaughter one of the infected birds and to send it at once in a water-proof wrapping to a laboratory for diagnosis. Rather complete controls have been set up to prevent the spread of the disease once it has been recognized. Provisions also have been made for vaccinations with living virus provided by the Government. (Foreign Crops and Markets, U.S.D.A.

WORLD EGG PRODUCTION IN 1949; CURRENT CHICKEN NUMBERS

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Egg production during 1949 increased about 4 percent over the previous year in the major producing countries of the world. Continued favorable egg prices throughout most of 1949, and more abundant feed supplies at declining prices in almost every country have encouraged poultrymen to keep more birds and increase the rate-of-lay in their flocks. World egg production, now about one-fifth above prewar, has recovered to the extent that most rationing has been discontinued Some governments find it necessary to encourage output of quality products and provide assurance of favorable prices to producers who are experiencing keener competition in domestic and export markets. Large feed-importing countries continue to control production and promote small farm flocks to bring about utilization of home-grown grains and farm wastes.

Chicken numbers increased substantially in response to high prices during the 1949 hatch. The continued efforts of poultrymen and their respective governments to improve the quality of laying stock will be even more important in the immediate future as margins between costs and sales prices are narrowing. The presence of Newcastle disease has become more widely recognized and immediate attention is being given to this hazard to poultry flocks in a number of countries.

The largest increases in both chicken numbers and egg production were in European countries, a few of which have fully recovered from war-time deficits. Egg production in France, Sweden, Switzerland and Spain was above prewar and in the United Kingdom, Ireland, Denmark and several other Western European countries approached 1934-38 levels. Countries which have encouraged the keeping of small farm flocks generally have made the greatest gains in chicken numbers, but their yields, though improving, have not made a comparable recovery since these have been the less well managed flocks. The Balkan countries, which have just begun significant recovery, have reported less pronounced restoration and are still concerned with obtaining sufficient egg supplies for their domestic markets. Practically every country exporting eggs prior to the last war is again active and of paramount

importance are Denmark, the Netherlands, Hungary, Belgium, Poland and Sweden. None of the European countries, however, has attained prewar export levels.

Canada was the only important country reporting a significant decline in eggs produced during 1949. The smaller hatch of 1948 limited the number of layers during 1949 although high prices during most of the year promoted a record rate-of-lay. However, the United Kingdom's contract was not renewed for 1950 and prices dropped drastically during the last months of 1949. The recent announcement of a price support program by the Canadian Government has steadied the market, but at a level somewhat lower than during the term of the United Kingdom contract. The Canadian egg output is expected to decline further in 1950 and production of poultry meat will probably continue more important.

Egg production in the *United States* during 1949 increased 2 percent over 1948, due largely to a record yield of 165 eggs per hen, since the average number of layers was about the same. Favorable price-cost relations during the first of the year encouraged a large hatch, which resulted in a 7 percent increase in chicken numbers on farms as of January 1, 1950 over a year earlier. Egg prices fell sharply in November and December and the Government support price for 1950 was announced at 37 cents (8 cents below 1949). Culling has not been excessive and production in 1950 continues high.

In 1949, *Irish* egg production was 20 percent above the previous year due largely to greater poultry numbers which are now above prewar. This increase made possible exports twice as large as those of 1948, all of which went to the United Kingdom. Egg prices to Irish producers have tended downward slightly during the year, but are not expected to depress output.

The Netherlands' egg production increased about 27 percent during 1949. The Government which hopes to export larger quantities of eggs to the United Kingdom and Western Germany in 1950 has announced that it will allow an increase of one-third in the size of hatch this year over 1949. High cost of imported feed is becoming more important to Dutch poultrymen as prices for eggs declined slightly during the year.

Egg production and chicken numbers in *Denmark* continue to increase substantially as the Danish export markets remain receptive to high quality eggs. Exports which are directed mainly to the United Kingdom and Western Germany

were twice as large in 1949 as in 1948, but were only about three-fourths of prewar. The large imports of grain necessary to the poultry industry are a major problem and cutbacks in imports may be reflected in the poultry industry this year.

Agricultural authorities in *Switzerland* were somewhat successful in the first year of their attempt to level out the seasonal production through seasonally regulated prices. The hatching period, which was permitted to run until June 15 last year, will be closed on May 31 in 1950 in an attempt to restrict the number of eggs hatched. The Swiss also are confronted with limited indigenous feed supplies and the necessity of importing feed from hard currency countries. Domestically produced eggs are meeting increasing competition from eggs imported from countries with devalued currencies.

Poultrymen in both *Sweden* and *Finland* are now directing more effort towards finding export markets, inasmuch as production is more than ample for their current high domestic consumption. Egg prices during 1949 in these two countries were down from 1948 and are expected to continue this trend, but each has a much improved feed supply which may somewhat offset lower prices.

Greatly increased supplies of eggs were available to consumers in the *United Kingdom* during 1949 with production and imports respectively 16 and 36 percent above 1948. Even though there has been a 50 percent reduction in feed subsidies, further improvement in production is expected in 1950 because the British Government still guarantees high egg prices to farmers and increased feed supplies have been made available.

Egg production in *Spain* is reported above 1948 mainly because the incidence of Newcastle disease is thought to be less severe in 1949.

More chickens and ample feed made *Belgium* a net exporter in 1949 after being a net importer of 122 million eggs in 1948. Belgium exports went to Western Germany, Argentina and Uruguay. *Argentina*, normally an exporter of eggs and poultry, made only minor shipments of eggs late in the year. Production of eggs and poultry during 1949 was about the same as 1948, but increased domestic consumption utilized most of the output. A light corn crop and high feed prices in the region of Argentina in which poultry is important is expected to curtail any increase in poultry during 1950.

EGGS

Number produced [1]in specified countries, average 1934-38, annual 1946-49

Continent and country	Average 1934-38	1946	1947	1948	1949
	Million	Million	Million	Million	Million
North America					
Canada	2,638	3,883	4,484	4,274	3,626
Panama			52		
United States	35,498	55,590	55,252	55,158	56,382
Cuba	320	300	288	276	318
Dominican Republic		60	60		
Europe					
Albania	143				
Austria	663	270	285	350	400
Belgium	1,693	1,100	1,380	1,440	1,530
Bulgaria	682				
Czechoslovakia[2]	1,958	776	903	1,110	1,380
Denmark	1,979	883	992	1,392	1,870
Finland	317	93	117	176	266
France	6,200	6,200	6,300	6,100	6,800
Germany (Tri-zone)	3,700	2,150	1,975	2,250	2,800
Greece	550	349	376	384	390
Hungary	1,050		650	750	
Ireland	1,086	801	733	844	1,014
Italy	5,600	3,600	4,300	4,450	4,550
Luxembourg	40		30	35	40
Netherlands	1,978	480	1,052	1,159	1,480
Norway	369	155	198	263	330
Poland and Danzig	3,500	2,276			
Portugal	250				
Rumania	1,500	[3]532			
Spain	1,700		1,992	1,800	1,860
Sweden	900	1,149	1,217	1,335	1,555
Switzerland	423	391	442	520	559
United Kingdom—Farm[4]	[3]3,871	2,418	2,600	3,000	3,500
Total	[3]5,098	3,850	4,000	4,300	5,000
Yugoslavia	1,000				
Asia					
Lebanon		65	60	48	42
Palestine	108	200			
Syria	92	120	90	110	120
Turkey	1,003	863	895		
Japan	3,553	936			
India		2,794			1,085
Pakistan		571			
Philippine Islands				250	
South America					
Argentina	1,127				
Brazil				2,160	
Chile		520	460	370	
Paraguay			100		
Uruguay	289	358	326	330	300
Africa					
Egypt	751				
French Morocco	1,000				
Union of South Africa			372		1,200
Oceania					
Australia[5]	708	1,358	1,470	1,431	1,443
New Zealand	430				450

[1]Relates to farm production in Canada and the United States, but data for many countries not explicit on this point. [2]Postwar numbers possibly under reported. [3]58 counties. [4]Year ending May of year indicated. [5]3-year average. [6]Commercial production for year beginning in July of year reported.

CHICKEN

Numbers in specified countries, average 1934-38, annual 1946-1950

Continent and Country		Date Applicable	Average 1935-38	1946	1947	1948	1949	1950
			Thousands	Thousands	Thousands	Thousands	Thousands	Thousands	Thousands
North America								
Canada	[1]	Dec. 1	44,077	[5]1,697	50,728	47,310	37,169	39,139
Guatemala			[2]664					
Mexico		March	[3]36,368					
Panama			[2]195	1,372	1,528			
United States		Jan. 1	408,177	530,203	474,441	461,550	448,676	481,198
Cuba		July		10,500	10,000	9,000	8,500	9,000
Dom. Republic			2,358	1,906	1,900			
Europe								
Albania			2,060	1,800				
Austria	[1]	Dec. 3	[2]8,862	5,300	5,400	5,800	5,600	6,100
Belgium	[1]	Dec. 31	16,500	11,111	13,333	13,500	16,100	16,300
Bulgaria	[1]	Dec. 31	[4]11,814					
Czechoslovakia[5]		Jan.	[2,6]31,875		10,660	11,982	14,987	
Denmark		July	[2]27,643	18,388	19,271	23,445	28,000	
Finland[7]		Sept. 1	2,853	1,171				
France[8]	[1]	Fall	145,000		145,500			
Germany (Trizone)	[1]	Dec.	51,225		27,500	25,500	29,000	35,000
Greece[9]	[1]	Nov. 30	11,679	8,206	7,500	8,625	9,700	
Hungary		Feb. 28	[4]17,880	[10]16,000				15,000
Ireland		June	15,961	15,263	14,537	17,079	18,524	
Italy			76,000		[11]50,613			
Luxembourg	[1]	Dec.	[2]515	275	350	380	400	400
Netherlands[12]	[1]	Dec.	[13]29,632	3,078	7,315		9,843	10,584
Norway		June 20	5,686	2,926	3,768	4,663	5,500	
Poland & Danzig		July	50,000	20,000		39,000		
Portugal	[1]	Dec. 31	[14]5,716					
Rumania			[2]31,853	[15]10,939		15,000		
Spain		July 1	[16]28,972	22,468		37,200	33,500	35,000
Sweden		June	[10]10,980		12,395	13,991	15,000	15,100
Switzerland	[17]	Apr.	5,544	5,043	5,025	5,900	6,100	
U. Kingdom Farm		June	73,402	61,723	64,880	79,219	88,706	
Total		June	—	76,393	81,526			
Yugoslavia	[1]	Dec. 31	18,021					
Asia								
Lebanon	[1]	Dec.	—	1,400	1,450			
Palestine			[2]1,914					
Syria			1,525	2,029	1,826	2,235		
Turkey			16,794	18,422	18,514	17,303		
China			265,765	184,984	204,115			
Japan		July	51,094	19,000				62,600
India			—	146,081				
Pakistan			—	44,732				
Phil. Islands			25,365	9,434		23,000	25,000	
South America								
Argentina		June	[18]42,988					
Brazil			[19]59,000			60,000		
Chile		June	[2]1,026	5,000	4,500	3,600		
Paraguay			—		2,000			
Uruguay			[18]4,814	5,312	4,912	3,952	3,752	
Africa								
Egypt		July	[14]26,889					
French Morocco			[20]50,000					
U. South Africa		Aug.	[18]14,000	14,000	16,000	15,834		
Oceania								
Australia	[1]	Dec. 31	15,541	15,000				
New Zealand		March	[14]3,489					4,200

Austria discontinued price control and rationing of eggs early in 1949. The easing of controls somewhat stabilized the market at profitable prices to poultrymen.

Recovery in *Greece* has been delayed because of disease, feed scarcity and continued guerilla attacks. However, egg prices remain strong and considerable effort is being made to supply the local market.

Poultry numbers in *India* have dropped drastically since the previous report in 1946. The decrease is explained by Government officials as due to the movement of Moslem poultry keepers from India to Pakistan.

Australian poultrymen, who currently have a contract with the United Kingdom for their exportable surplus of eggs, had considerable difficulties during 1949 because of high cost feeds, short supply of by-product feeds and restricted transportation during the hatching season because of the extended Australian rail strike. A smaller hatch, decreased production and reduced exports are expected in 1950. Currently poultry meat prices are more favorable than prices paid for eggs.

The *New Zealand* poultry industry has continued to expand under controlled prices and improved feed supplies.

Record egg production has been reported in the *Union of South Africa* as prices held firm throughout most of the year. Poultrymen of that country had considerable misfortune in the latter part of the year with an outbreak of Newcastle disease and trouble with poor keeping quality of their exported eggs. Effort is being made to control these handicaps.

Production statistics concerning the *Chinese* egg and poultry industry are not available, but reports indicate that exports of egg products from Central China increased several fold in the latter part of 1949 as compared with a year earlier. This trend is expected to continue into 1950 as the cessation of fighting in that area has permitted the establishment of inland transportation and the construction of processing plants. (Foreign Agricultural Circular FPE 2-50, March 20, 1950.)

1 End of year estimates (October to December) included under the following year for comparison. Thus for Canada, the December 1, 1945 estimate of 51,697 is shown under 1946. 2Average for 2 to 4 years only. 31949. 41935. 5Postwar numbers possibly under reported. 6May 1. 7Adult poultry. 8Represents chickens raised. 9All poultry. 10September. 11Hens and cocks. 12Hens and pullets. 13June. 141956. 15 58 countries instead of 71 as prewar. 161939. 17April. 181937. 191938.

Office of Foreign Agricultural Relations.

SCIENCE AND THE POULTRY INDUSTRY

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One of the objects for which our Association exists is to encourage the dissemination of knowledge so that the industry may be given the opportunity to develop on the soundest possible lines. It is laid down that this desirable state of affairs is to be attained by the employment of various agencies and activities among which are to be encouraged as sources of new knowledge— practical experimentation and scientific research.

Those responsible for the Constitution of the Association have seen fit in their wisdom to differentiate between experimentation and research. Is there really any fundamental difference between these two suggested methods of obtaining knowledge?

Let us start at the beginning and ask the question "What is the purpose of knowledge, and how is it to be obtained and utilized?" The purpose and usefulness of knowledge is to be able to predict with accuracy the consequence of any particular sequence of events.

There may be amongst us individuals with a rare and miraculous gift outside human comprehension whereby everything they do with poultry turns out just as desired and they have no problems that they cannot cope with. The vast majority of us in the industry, however, realize that we are faced persistently in our own flocks with difficulties of immediate concern to us. We are also aware of wider problems affecting the efficiency of the poultry population of the country as a whole for the solution of which present knowledge is inadequate.

Knowledge may be gained in two distinct ways: in the first place from direct observation of natural phenomena, and in the second from planned experimentation. I realize the difficulties involved in stating definitions to cover all eventualities but I am attempting to obtain a reasonable perspective of the scope of knowledge that may be of help to us in the poultry industry. For this purpose I would include the accumulated experience of generations of breeders under the first

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An address given at a meeting of the United Kingdom Branch of the World's Poultry Science Association, December, 1949.

heading, i.e. knowledge obtained by direct observation of natural phenomena. The experience of the breeder, where it is evidence of truth, is proving and has proved useful when his observations have been the expression of a basic principle applicable to all poultry stocks. On the other hand his experience is based on a particular set of conditions in space and time and may not always be generally applicable. For instance, inbreeding was an important tool in Bakewell's successful technique of livestock improvement, but he would be a bold man who held today that inbreeding would always produce desirable results.

The dangers of experience, in the sense I have implied, are two-fold: (1) unless the results of observations are carefully recorded it may happen, the human mind being what it is, that a true and complete picture is not retained. Undue emphasis on a selected portion of the experience can lead eventually to a complete distortion of the truth, and (2) the ever present danger of projecting the results of a limited field of observation to cover completely one line of activity or even many others outside the original experience. This is particularly true in the absence of information as to why the desirable results occur for then there is no way of judging what the limiting conditions are and this may give rise to the assumption of an infallibility which is far removed from truth.

Experience has given us a massive accumulation of knowledge and nonsense, not perhaps an inextricable tangle, but offering considerable difficulties to those who work to add to natural knowledge. It would not be right to reject accumulated experience out of hand, but there can be no compromise with truth. Where the validity of a generally acceptable dogma is in doubt, adequate experimentation must be devised by the investigator to obtain factual evidence on particular matters. This is the kind of work that not infrequently leads the practical man to remark that the scientist in many cases wastes his time since every poultry keeper could have told him the answer. Everything, however, comes down to a question of truth and unless the validity of impressions can be proved we have no firm foundation on which to erect an edifice of knowledge.

At this point we may begin to discuss the second of our ways of gaining natural knowledge viz. by planned experimentation which, as a corollary, involves the distinction to be made between practical experimentation and scientific research.

The purpose of planned experimentation is to alter the existing structure of the industry or some part of it by increasing the efficiency of its component parts in a desired direction. It is this definition which leads to the possible distinction that may be drawn between practical experimentation and scientific research.

To my mind *scientific research* implies an orderly continuing sequence of experimentation, the data from which are to be interpreted in terms of basic principles of general application. *Practical experimentation*, on the other hand, may employ the same technical procedures, but its purpose is to obtain factual information as an end in itself. The knowledge so gained is normally applied for the solution of one particular point whether or not it is part of a much wider general problem. Scientific research as I have defined it, is primarily concerned with the interpretation of fact in terms of acceptable theory or biological laws and may be said to have an appreciation of both effect and cause, while with practical experimentation the interest is always in effect.

Perhaps I could make my point clearer by giving some examples. Suppose, for instance, it is important for the poultry keeper to know what is the best percentage of a particular ingredient of the diet to give maximum egg production. Groups of birds are put on test using for each group diets containing variable amounts of the substance whose effect is to be analyzed. Statistical techniques may be used in designing the experiment to ensure that the data obtained are adequate for the purpose. The number of eggs laid by each group indicates that one particular percentage gives the best results. This then is incorporated directly into practice. This is what I call practical experimentation. It only becomes scientific research, in the sense that I have defined it, when the investigator asks himself, "Why should this particular amount of the ingredient give the best results?"

To give another example, this time from breeding science: you must all be aware of the use that is being made in the States of crossing inbred lines of chickens for commercial egg producing stock. We have had some experience of this and some of our results with Brown Leghorns are given under the heading PRODUCTION in Table II. The figures look striking enough to press for a general application of this procedure to practice, but there are still some questions to be answered. What is the nature of hybrid vigour? Why is it only certain inbred lines nick to give favorable results? The answer is to

TABLE I

SEX—RATIO:

1929-1947: *19510* : *19605* or *49.9%*

Sex-ratio by seasons: Jan.-Mar. 50.5%
Apr.-Jun. 49.6%
Jul.-Sept. 49.7%
Oct.-Dec. 49.7%

INCUBATION RECORDS.

1938-1947: 38144 eggs set. 17% Infertile
19% Dead in shell
64% Chicks hatched

77% of fertile eggs hatched

Seasonal Variation	*Infertility*	*Hatchability (as set)*	*Hatchability (of fertiles)*
January	22%	62%	79%
February	17	63	76
March	16	64	76
April	17	65	77
May	13	68	78
June	11	73	82
July	15	67	79
August	18	63	77
September	23	59	77
October	25	58	77
November	27	58	79
December	22	61	77

PRODUCTION RECORDS:

(1935/1948) Pullets: 14 years.

Initial Population	Eggs Laid	Mortality	Late culls	Henhoused Average
2993	450226		1188	150 eggs/bird

Seasonal Variation in Production of Survivors: 1935/48 Pullets

Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.
6.7	9.2	10.8	13.2	19.6	20.9	20.6	18.3	17.9	16.1	13.3	7.2
	39.9				79.4				54.5		

TOTAL 174

MORTALITY:

Deaths in pullets (1935/1948): 11% of initial population per annum.

Causes of Death

Vascular	2 %	Digestive	0.5%
Reproductive	3 %	Respiratory	0.5%
Urinary	1.5%	Lymphomatosis	0.5%
Cannibalism	1.5%	Tumours	0.5%
Miscellaneous	0.5%	Accidental	0.5%
TOTAL	11 %		

be sought from scientific research; practical experimentation has only indicated the continued existence of problems to be solved.

It is this difference in conception of the role played by these two methods of approach to problems that confuse the practical man when he attempts to assess the relative values of research and experimentation. With practical experimentation he finds no difficulty because the problem tackled, generally unrelated to wider issues, deals with something of immediate interest in the practice of his business and he can appreciate the value of a solution of it to him.

There should be no real difficulty in the way of practical man accepting scientific research as a valuable aid to progress once he understands that its ultimate purpose is to provide him with accurate knowledge for the general improvement of practice.

Since this might be construed as a plea to give the scientist a free hand in his investigations without contact with the industry which his researches are ultimately designed to benefit, it might be as well at this point to indicate the necessity for the establishment of good and profitable relationships between science and practice.

Both have at least major interests in common—they work with poultry, and their ultimate objectives however differently expressed are directed towards the same end, viz. for the ultimate betterment of themselves and the industry.

The scientist who comes to work in the poultry field generally has little background of practice to help him decide how his energies might most profitably be directed. He could, of course, devote a considerable amount of time to acquiring a knowledge of the industry through contact with individuals or groups within it. On the other hand, an organized industry might be expected to provide from accumulated experience a series of problems deemed to be of general importance and urgently requiring solution. Finally, he could, by observation of a particular flock under his control, gain his own background of experience from which to develop a research programme.

In the various sciences directly employed in poultry investigations all these methods of obtaining background information have been followed at one time or another. We have been primarily interested in the physiology and genetics of reproduction—sex and breeding—not perhaps the happiest choice because, long before the advent of the sciences, (and since) these are two fields where every man thinks he can give an answer to most if not all of the questions, and the answers are so variable. This is one reason why we at Edinburgh

have been concerned in gaining much of our experience at first hand.

In the absence of any real facilities for poultry investigations we had started keeping birds, brought in as required on free range. However sound such a method might be in practice, it had certain disadvantages that decided us to keep birds under conditions much more suitable for experimental work. So, when reasonable facilities were made available in 1929 they were provided by a building in which the birds, kept under intensive conditions, were easily available for critical observation. Because we had been troubled greatly by disease and extreme variation in quality of stock, the attempt was made to build up our own experimental flock from a relatively small number of healthy birds and not to contaminate them in the future by the introduction of fresh blood from outside. We also decided to record our observational experiences as carefully as possible. How far has this experience been a guide to us in gaining an appreciation of the major problems facing the industry? Let us see.

In the first Table I have set out certain observational facts that are of concern to breeders, hatcherymen, and commercial egg producers. They are not the limits of our experience with the flock but merely some of the more important findings which serve to indicate broad fields in which research might be employed profitably. They are, I feel, a fairly close representation of what the present state of our industry should be with reasonable management and husbandry. (The national average of 90 eggs per bird per year if it were based on pullet production alone could only be an indication of shockingly bad practice). Of course we would have a much more accurate picture of the state of the industry if such over-all figures were readily available from all sections of it. This is a service that would inevitably lead to the establishment of a much closer relationship between science and practice. In the absence of similar evidence from the industry as a whole, it will be at least useful for you to compare our results with your own flock performance.

DISCUSSION ON TABLE I

Such figures as I have given in Table I may be dissected to formulate our ideas on the possibility and extent of improvements that might be made. Let us compare Table I and Table II. In this second Table, I have selected certain data from the over-all picture; they do not relate to individuals but

to groups of birds and are merely intended to indicate a high upper range of performance in qualities that are economically important.

We are not yet into the research field so that I can emphasize again the dangers of experience tending to derive universal application from insufficient knowledge, or personal bias.

One might be tempted, disregarding the purposes for which the flock had been built up, to suggest that selected data show quite clearly that the poultry industry should adopt the intensive system of husbandry; or that all flocks should be closed ones with no importations of outside blood; or that inbreeding leads to the conservation of desirable qualities; and so on, and so on.

In point of fact these data, and others like them are of value in so far as they form the basis of experiment. The Edinburgh flock has been designed as an experiment, one certainly that has provided us with experience, but its initial purpose was to provide true breeding lines for certain selected qualities that individually played an important part in the economic value of the fowl. Simply stated we have attempted to make pure lines for the investigation of the mode of inheritance of body size, egg weight and such factors as rate and persistency in egg production. Whatever experimental procedures we adopted that differed from normal practice, we were not so sanguine as to suggest that we could solve great problems in a relatively short time that still remained after decades or centuries of selective breeding. We might, by sheer chance have hit on something that would revolutionize practice, but we haven't. The idea I want to bring out here is that the solution of breeding problems involves a long term approach requiring, as I shall hope to show later, not only facilities better than we have ever had in this country, but a relatively tremendous increase in scientific personnel.

The genetical experimentation involving investigations of production problems was one of two projected lines of attack, the other main interest was a physiological approach. We knew that the breeding side of our studies would involve many years of preparation before we were in a position to produce results but coincident work on the various complex reactions that take place within the body of the hen to produce the final product—the egg—might not only satisfy a natural scientific curiosity but also provide a different solution to a common problem. If genetics was a new science offer-

TABLE II. *Selection from recent data to indicate the possibilities for improvement.*

INCUBATION

1948:
Pen 18 Eggs set: 1070. Infertile: 2.3 Dead germs: 12.5 Hatched: 85.2
(Yearlings)
Pen 27 Eggs set: 367. Infertile: 2.5 Dead germs: 24.3 Hatched: 73.2
(3-9 yr. olds)
(Eggs set throughout the year to include effects of seasonal variation)

PRODUCTION:

1948 Pullets

Pen.	*Pullets*	*Aver. Prod.*	*Best Twelve*	*Aver. age*
26	22	225	294 280 279 250 243 239 239 237 236 235 235 232	=250
28	23	218	303 295 273 262 261 251 249 248 241 240 239 226	=257

MORTALITY

313 pullets mated up in 14 pens on the 1st September, 1948.
4 pens (85 pullets) gave no mortality to 1st October, 1949.
(These 4 included the high production pens 26 and 28 above)

ing scope to investigate scientifically the breeders' problems so also could the not much older science of endocrinology. It was all the more hopeful when it was shown that the sex-gland of the newly hatched female chick contained abundant potential eggs; enough to provide for an egg a day over a period of many years. To my knowledge no one has succeeded in obtaining more than 1515 eggs from a hen during her lifetime, which is many less than might be expected.

Up to this point I have referred to *Experience* and *Experimentation* with the Edinburgh flock and should like to pose the question as to whether our incursions into the endocrinology field have created a divergence in the mind of the breeder between what is useful and understandable on the one hand, and on the other what is apparently remote and beyond his experience. They should not, of course, because the breeder was a practicing endocrinologist long before the science was developed. He knew by the growth and reddening of the comb when a pullet was coming into production; by handling he could tell from the pelvic bones whether she was laying or not. It remained for science to give an explanation of how and why these phenomena appeared. Endocrinology has made rapid strides in recent years and it is only necessary to give some of the results very generally to stress its ultimate importance in breeding practice. In so far as the development and ripening of the sex organs is concerned this is controlled by the pituitary gland at the base of the brain. Studies on migration of birds linked up the effect of increasing light

on the activity of the pituitary gland and the coincident stimulation of the sex organs. Many of us use the results of these scientific studies to increase winter egg production by artificial lighting of the poultry houses. The pituitary gland has many functions that have not, as yet, been completely investigated. Some years ago we were able to produce all the symptoms of broodiness in young Leghorns long before the age of sexual maturity by injections of a preparation of this gland. I do not want to become too deeply involved in matters that might detract your attention from the general purpose of this address, but think for a moment on the implications that might be derived from this relationship between pituitary and sex organs. It suggests that it has a very important bearing on everything in the production field that you, as breeders, have done. Since the gland does not exert any influence during the moult it obviously functions periodically so that by your methods of selection for high egg yield you have pushed the time at which the pituitary gland becomes inactive further and further backward towards the end of the year—in some individuals it is possible to establish a condition in which the periodicity may completely disappear and continuous egg laying ensue without obvious break for about two years. This would not have been possible unless particular cycles of pituitary activity showed evidence of inheritance. This is brought out by the observations recorded in Table III.

TABLE III. *Percentage of Pullets entering the Moult by Months.*

	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.
Line B	0.6	2.5	8.5	27.0	36.6	14.6	7.7	2.5
Line S	3.8	2.8	29.2	31.1	20.8	4.7	5.7	1.9

Aggregates:	*June/Aug.*	*Sept./Oct.*	*Nov. Jan.*
Line B	11.6	63.6	24.8
Line S	35.8	51.9	12.3

Inbreeding accentuates the differences that exist in the general population and these figures perhaps give a useful example of how this technique can be employed not only by the scientist as a starting point to investigate problems of inheritance, but also to provide the breeder with information on which to base a rational programme of selection until provided with more exact knowledge from research.

I have mentioned so far the importance of the pituitary gland in its relation to the functioning of the sex organs, but the ovary itself has important secondary functions apart from producing the egg. It is, with the thyroid gland, responsible

for the typical sex differences in color and structure of plumage in the Brown Leghorn; it maintains the oviduct in proper condition to produce albumin and shell; it relaxes the pelvic ligaments; it dissolves the hymen present in the oviduct in pullets before they come on to lay. (Where this function is incompletely performed first eggs from pullets have a characteristic blood ring on the surface of the egg. This forcible destruction of the remaining tissue of the hymen by the passage of the first egg might easily offer a focal point for the introduction of pathogenic organisms—a possible link in the chain of events leading up to the high incidence of oviduct troubles in our poultry flocks); it is also a secretion of the ovary that produces the red comb of the laying bird, and maintains it at full size during the production cycle. It also determines when the egg shall be laid. As you all know, the ripe yolk drops from the ovary into the funnel of the oviduct, and on its way down receives its coating of albumin; then it comes to rest in the shell gland, and is held there until the shell is deposited. It can only be released when the ligaments attached to the lower end of the gland are relaxed to allow the passage of the egg to the exterior. There is evidence to show that this results from a hormone stimulus—just as in the case of the continued relaxation of the pelvics in the laying bird. One indication of the practical application of these studies is given by the use of stilbestrol tablets in tenderizing cockerels.

I have not the time to give you a complete picture of the activities of these several glands of internal secretion within the body, nor of their dependance upon one another, but perhaps I have said sufficient to stimulate your interest in researches that are bound to have an important bearing on breeding practice some time in the future. Scientific work with poultry in this field has become a major interest and it has received recognition this year in the States by the award of the Borden Prize to Dr. Richard Fraps of Beltsville for his contributions to our knowledge of ovarian function in the fowl. I would just like to remark briefly on what to me is one of the most important investigations for the endocrinologist—the possibility of sex control. As you can see from Table I males and females are produced in equal numbers. So many of the males produced must necessarily be eliminated at an early age because the domestic fowl is not monogamous, and also, of course, because it is the female that is economically more important. Much work has been done since the pioneer-

ing work of Crew indicated the possibility of sex reversal in the fowl and important investigations are still in progress, particularly in France.

You may think that from all this research both in the physiological and genetical field that results applicable to practice should be turned out with regularity. That this is not so depends on many things. In the first place the general problems are too complex to be resolved until all the jig-saw pieces of knowledge are fitted into a composite picture. In the second place, it is now abundantly clear that it requires more than one or two sciences to provide the jig-saw pieces to be fitted together.

Let us again refer to personal experience. When the experimentation was started at Edinburgh it was assumed that, providing the husbandry and nutrition were standardized as far as we were able, it should have been possible by the selective breeding technique adopted to reduce variability to a very large extent in the qualities specifically bred for.

That we were not able to do this suggests two things; either the qualities economically important are not inherited on a simple Mendelian basis, or the environment does not affect all birds equally whatever their genetic constitution. The first alternative might have been considered surprising following the brilliant pioneering work in genetics of the Cambridge school where the inheritance of certain morphological structures, complex in themselves, were found to depend on simple genetic situations.

With regard to the second there is still some confusion as to the meaning to be attached to environment. In the sense I use the term it means collectively every extraneous and intrinsic factor apart from the genes directly responsible that could conceivably affect the expression of inherent qualities of the individual. It does not imply merely such difference as between intensive and free range system, or between pellet feeding and mash feeding, or any of the other major differences incorporated in modern practice.

You will have gathered from Professor Lerner's talks to you that a modern approach to breeding problems is through the statistical evaluation of the role played by heredity and environment respectively in determining the expression of a particular quality. He showed you how it was possible to predict progressive gains in production by this type of research which is based on a fundamental premise that the characters

of economic importance are controlled by many genes rather than simple situations.

Whatever the ultimate solution of our breeding problems it must not be forgotten that the initial stimulus for improvement programs that have been shown to be relatively successful at least, was based on the assumption that certain qualities, if selected for, could be incorporated rapidly into the stock. Hays has produced evidence in favor of the view that many qualities are comparatively simply inherited.

The population geneticist opens up a new vista of research leading to the ultimate improvement of practice by use of measurements of variability, but there still remains to some of us the absorbing problem as to whether its very nature can be elucidated.

We have realised that no one science can hope to solve those problems working independently. Genetics may be defined as the study of variation, but to understand its nature we must have physiologists who can provide us with knowledge of the normal functioning of the body of the fowl; as well as general physiologists we must utilise those from the special branches of nutrition and endocrinology. We need pathologists, animal behaviourists, chemists, physicists. We have come to know that even though we have a material, and the background of experience, the major problems of the industry will only yield to a concerted attack by all the sciences involving the fowl as a living organism. The establishment of the Poultry Research Centre at Edinburgh by the Agricultural Research Council has made this possible.

There is still one important question to be discussed and that is the effective relationship to be developed between the scientist and the industry he serves. Excluding any reference to myself, you have been fortunate in the past in that poultry scientists, so few though they have been in relation to the importance of the industry to our general agriculture, have not hesitated to come to you and try to give you an appreciation of their endeavours. What you must realise, painful thought though it may sometimes be, is that the value of the scientist's work depends not so much on whether he can make it intelligible to the layman, but as to whether his researches are acceptable to his fellow workers as contributing to natural knowledge.

It is the scientist's primary function to provide knowledge but he cannot always be expected to disseminate it in a form palatable to the layman's taste. In practically every other field

of activity, except agriculture, he is not normally expected to have that peculiar inventive mind that foresees at once how it should be applied in practice. Perhaps that is why agricultural science has not made the progress that might have been expected of it. There have been too few of us in the field in the past and that has meant that activities of the scientist have been diffused. Contrary to experience in other activities where science is employed, he normally only can devote some proportion of his time to his researches. With the development of the National Agricultural Advisory Services however, it is to be expected that this is a body that will undertake the interpretation of the work of the scientist to the industry. There are also our colleges which, being closer to the industry in general than the scientist and more interested in practical experimentation than the workers in the research institutes, should be aware of current research and its implication in practice.

Whatever the final organization of the path of knowledge from science to practice might be, I must say that I welcome on occasion these direct contacts with industry that I have been privileged to experience today.

ANNUAL MEETING OF THE UNITED KINGDOM BRANCH OF THE WORLD'S POULTRY SCIENCE ASSOCIATION

The third annual meeting of the United Kingdom Branch of the World's Poultry Science Association was held in London, England on March 24, 1950 awith 74 members present. On January 1, 1950 there were 259 members. Dr. A. W. Greenwood is President and Major Ian Macdougall is Secretary-Treasurer.

The following were elected to the Executive Committee: R. F. Gordon, R. Coles, E. T. Halnan, D. J. G. Black, W. Marshall, J. E. Wilson, G. R. H. Nugent, E. B. Lomax, J. Sutton, Miss E. E. Kidd, R. B. Shaw and K. Wilson.

The annual general meeting was followed by a conference at which symposia on "Fowl Paralysis" and "Hatchability" were submitted. There were 122 members present.

THE POULTRY INDUSTRY IN SOUTHERN ITALY

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Teora (Avellino) Italy

The zone of Southern Italy that the following brief article has reference to is that part where the inner chains of the Appennines divide the waters of the River Lele from those of the Ofanto. The first flows into the Mediterranean Sea while the latter brings its waters into the Adriatic. If one would run his finger along the marked crest of these mountains, on any Italian map, and stop where the Appennines divide in two chains; one following the Mediterranean coast to the extreme end of Calabria while the other forms the semi-massive heights of Lucania, the zone is easily identified. This restricted locality has a very uneven climate because the altitude goes from 200 meters above sea level (the town of Quaglietta) to 2,000 meters above (Mt. Cervialto) while the slopes have a large range of difference in climate depending also upon the exposure. The southern exposures are very warm, then follows the eastern and western, while the northern are very cold. Of course no flocks of poultry are found above 1000 meters.

BREED KEPT

The breed of chickens existing here, has no special classification. It would have been completely indigenous if it were not for the fact that some time ago Prof. Palladino of the Italian Department of Agriculture distributed a few Leghorn cockerels and also for the introduction of some Langshans, R. I. Reds and Rocks by private parties who imported them from Northern Italy from breeders who claim to have pure strains descending from American imported stock. The introduction of this new blood has not changed the general characteristics of the breed. If it is true that every now and then a complete red, white, or black subject is seen, it is also true that the majority has capriciously colored feathers and legs. It is almost impossible to find two birds alike. Their size—not form—on the other hand, is of a more uniform, light-middleweight. Every flock offers a different picture for the artist. Generally the farmers are satisfied with this breed because it is hardy, full of "pep" and capable of adapting itself to the different climatic conditions of this zone. And when one thinks of the disgraceful treatment the breed receives in being fed and housed, it is impossible to think that it possesses good laying qualities; nevertheless it is a good laying breed.

Above it is not mentioned that the breed produces few broody hens. This has caused a system of exchange amongst the farmers in order to hatch and rear the necessary pullets to replace the culled old stock. Those who are more fortunate to have more brooding hens than necessary, lend their hens to the ones in need and receive from the borrower a good laying hen which is held for all the period that the borrower uses the brooder. Another system is that the borrower must return the brooder at the end plus a grown cockerel and a pullet. The quantity of eggs entrusted to the hen are anywhere from 14 to 17. The eggs used are those produced the same day. The brooder is confined to the nest for all the period of incubation allowing her a few minutes in the morning and evening to allow her to feed and drink. They are confined, generally, in a measure used for grains called "mezzetto." This 50-centimeter high measure is covered by an upturned wicker basket which allows sufficient air to penetrate. No sods are placed at the bottom of the nest, under the straw, to supply a certain amount of humidity but nevertheless the percentage of eggs hatched is usually high, maybe because the humidity of the air—in this part of the country—is satisfactory for the purpose.

When the chicks are hatched, the farmer's wife to whom this care is entrusted, does not wait for the necessary time to pass before feeding the chicks. A few hours after being hatched they are fed bread crumbs softened in wine. Later they are fed crumbs of yellow corn bread and soon thereafter wheat is given them, and this never cracked. Even whole yellow corn is fed as soon as possible, and by the time this is fed, the hen and her chicks enjoy liberal pasture. No shelter nor shades are supplied to the young chicks but what they can find by themselves around the haystacks, etc. One thing can be credited to these women is that they are always on the alert to know which hens are the best layers so as to procure these eggs for incubation and also to know which hens to cull.

MARKETING POULTRY

Most of the farmers begin to sell their poultry when merchants of this line arrive in the town's fairs with their autos and coops or with their horses and wagons. A farmer never knows the market prices of the cities, so he carries his cockerel from one merchant to the other until his demand is satisfied or he is compelled to sell to the best offerer. All the

nearby towns of Teora, center of this zone, market friers and roasters with the exception of the town of Morra, where the males are caponized with the old system and what they call capons (the majority are slips) are sold in the fairs that take place before Christmas. About this time the culled hens are also sold.

MARKETING EGGS

The eggs are more than anything else a product of exchange. The farmers' wives, on Sunday, when they usually go to town, take their eggs to trade them for tobacco for their husbands or oil, salt, and other commodities for their home (salt and tobacco is a state monopoly and very expensive). Those who have flocks of above 15 chickens sell them for cash and use the funds as they please. The tobacco or grocery dealers who exchange these on their turn, sell their eggs to merchants from the cities who come to town once or twice a week. The town dealers are usually well informed as to egg prices in the cities but not so the farmers, who are martyrs of speculation. A few, who have flocks of chickens above 50, sell directly to the city merchants. This is the general system. The town of Oliveto is more fortunate. This town has a market every Thursday and dealers from Salerno, Naples and Avellino arrive. The producers sell directly to these egg dealers, eliminating the profits of the small town dealers.

DISEASES

The predominating disease is the wrongly called "Laringa Tracheitis" which demands, yearly, a very heavy toll. Other diseases have not made their appearance for years. The said disease, often destroys whole flocks and if it were not for tradition many would not keep chickens any longer. Fortunately the flocks kept in the country have very little contact with one another but in towns like Saint Andrea, where the farmers return to town every evening after their daily task, the flocks are housed in the town and their pasture is the streets and alleys. The contact between flocks spreads the disease like a forest fire, destroying as high as 90% when it appears. Regardless of this loss, the tenacity of the farmers is such that the following year new flocks are again seen.

Lately, a few, only very few, have begun vaccination. The hopes are that many will follow even though tradition against vaccination is strong. The few who vaccinate are also those who believe that the near future will bring changes and scientific methods will be used by the local breeders.

TWO NEW VARIETIES OF AUSTRALORPS

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The Australorp or Australian Orpington (Austral-Orp) was bred in Australia from the Black Orpington. By selection the Orpington was bred from a loose-feathered to a tight-feathered bird and these modified Orpingtons soon became popular as remarkable egg producers. Australorps were imported into South Africa and from 1925 they were bred on an extensive scale in this country. Today the Black Australorp is one of the most popular dual purpose breeds in Southern Africa.

From approximately 1931 experiments commenced with the breeding of the White Australorp. This new variety was admitted to the standard by the South African Poultry Association in 1939 and originated as a sport (mutation) from the black variety. The color changes which occurred in the Black Australorp resulted in the breeding of both the White and Buff varieties. In 1931 two Black Australorp hens at the Grootfontein College of Agriculture, Middelburg, Cape Province, showed color changes which were not accompanied by a moult and after the first annual moult in 1932 these birds were pure white in color. These color changes were described by Gericke (1934).

In 1932 the white hens were mated to a Black Australorp male and from this mating only 7 chicks were hatched. One female developed white feathers at 6 months of age and at 1 year she was pure white and represented the dams in every respect. In 1933 the dams were mated to their sons and the brother to his sisters. From these matings, 96 chicks were reared to 6 months of age and 5 pullets changed color by a depigmentation process between 4 to 5 months of age. After the first annual moult they were also pure white in color. The pullets far outnumbered the cockerels and as no color changes were observed in males it became clear that those which probably carried the white factor must have died in the shell. This pointed towards the presence of a lethal factor in male chicks.

The late Mr. N. H. Addison obtained Black Australorp breeding stock from the Grootfontein strain and in 1930 a few of their progeny also developed white feathers. This breeder bred pure white hens for several years.

At approximately the same time Mr. Dan Jacobs of Germiston, Transvaal, also bred white progeny from the black variety. He obtained both white pullets and cockerels. According to his records the first two White Australorp cockerels were bred in 1934. All the records show that the Black Australorp R.O.P. hen 316 and R.O.P. male 1169 were two important ancestors of the modern White Australorp.

The standard description of the White Australorp with the following exceptions is the same as for the black variety:

Plumage color: White throughout. In judging points will be deducted for such defects as brassiness and slight black ticking in the feathers. For solid black feathers in the flights and tail birds must be disqualified.

The beak should be white or horn-colored, the eyes brown or red, but the darker the eyes the better. The legs should be white in preference to slate, and birds with yellow or black shanks are disqualified. The toenails should be white or horn-colored, the pad of the foot pinkish white and the skin white. A slate color of the pad is a defect and yellow is a disqualification.

The White Australorp has been bred from high egg-producers and in this respect they compare favorably with the black variety. The highest official records of individual hens entered by Mr. Jacobs at egg laying competitions have been: 225, 228, 233, 235, 246, 256 and 258 A-grade or two ounce eggs in 48 weeks.

For breeding purposes males with a pure white color should be selected. Brassiness is common in males and slight black ticking in females. Occasionally white hens are bred with two or three partially black feathers scattered in the body plumage.

The adult White Australorp differs from the White Orpington in two respects. In the White Orpington the shanks are white and the eyes reddish bay whereas in the White Australorp the shanks are slate to bluish grey and the eyes are light brown to dark brown. Matings between White and Black Australorps revealed that the white variety carries the recessive white factor giving 3 blacks to 1 white in the F_2 generation. The blue shanks in White Australorps may be attributed to the action of gene d the recessive inhibitor of dermal melanin as Sturkie and Colleagues (1937) suggested in the case of the White Langshan.

For the past 7 to 8 years White Australorps have been bred with a uniform white color and there seems to be no

necessity for including the disqualifying clause in the standard relating to solid black feathers in the wing and tail. In the standard it is also stated that the legs should be white in preference to slate. The breeding of white shanks would be possible by changing the genotype from d to D through the introduction of dominant white shank birds such as the White Orpington or White Sussex.

The eye color is not uniform and in the majority of birds the eyes vary from shades of light- to dark-brown. With the exception of the White Bearded Polish, white varieties with white or pinkish white shanks have red, orange or reddish bay eyes. If White Australorps are bred with white shanks, their eye color will probably vary from red to reddish bay. Nelson (1947) has indicated that the brown iris differs from reddish bay only in that melanin pigment is scattered in the iridic stroma. Thus the black pigment when blended with red and yellow gives the visual effect of brown or brownish bay. Slinger and MacIlraith (1944) described various factors associated with the degree of melanization in the eyes.

The standard of the White Australorp must either adhere to slaty shanks and dark eyes or white shanks and red or bay eyes. Confusion will certainly result with such breeds and varieties as the White Orpington and White Sussex if the breeding of white shanks and bay eyes is permitted in White Australorps. Breeding for slaty shanks and dark eyes is possible by mating the White Australorp to the black variety and at the same time maintaining the high productive qualities of the latter variety.

As a table bird the White Australorp is superior to the black variety because the carcass does not show the objectionable blue pin feathers underneath the skin. The white variety may also be better suited to the hot climate in the African provinces than the Black Australorp.

The down color of the White Australorp chick is bluish grey. As soon as the body feathers replace the down, the chick develops into a white bird.

BUFF AUSTRALORP

The Buff Australorp originated from a strain of Black Australorps in which a few individuals exhibited red or buff feathers in the hackle and dorsal regions. These birds were mated in 1934 at the Grootfontein College of Agriculture and in 1935 Mr. Addison obtained a few of these birds. By mating them to White Australorps he further weakened the exten-

sion factor (E) for black and over a period of 10 years produced buff progeny. After his death, in 1947, the buff birds were purchased on behalf of the Agricultural Research Institute, Pretoria, and transferred to the University Experimental Farm.

For the past 10 years only a small flock of less than 40 birds were bred per annum and hence close inbreeding had to be practiced. In the breeding season from June to September 1949 more than 100 Buff Australorp chicks were produced and about 50 first cross Buff x Black Australorp. Through back-crossing it will be possible to improve the standard characteristics and economic qualities of the buff variety.

The Buff Australorp was officially recognized by the South African Poultry Association at the annual Conference in Johannesburg, April 1949. The standard description with the following exceptions is the same as for the black variety.

Plumage of the male: Rich buff ground color with the wingbow darker than the remainder of the body color. Primaries, secondaries and tail should be black edged with buff.

Plumage of the female: Clear even buff ground color. The wing and tail feathers should also be black edged with buff but the black color should not be as prominent as in the male. Solid black in the wing and tail feathers of both sexes is a disqualification.

The color of the beak, eyes, toenails and skin should be the same as for the white variety. The shanks should be slate in preference to white.

In the buff breeds and varieties of birds the standard stipulates that the ground color must be uniform buff. Adult Buff Australorp males exhibit a darker or richer wingbow than the remainder of the body plumage and therefore this characteristic has been retained in the standard.

Contrary to the white variety the majority of Buff Australorps have reddish bay eyes and white or slaty shanks in both sexes. These characteristics may have been introduced through the Buff Orpington but it will never be known if the late Mr. Addison bred from this buff variety. It is accepted that black birds are genetically buff in color and there appears to be no reason why the Buff Australorp could not have been bred from the black variety.

Through the crossing of Black and Buff Australorps, birds with slaty or blue shanks and dark eyes will be bred at the Experimental Farm. The Buff Australorp is an attractive bird and should become popular with a large number of

poultry producers. A decade ago the Buff Orpington was a great favorite but only small numbers were produced and unfortunately they were not bred for the characters associated with high egg production.

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ARGENTINE CURRENT POULTRY SITUATION

The Argentine poultry and egg situation is generally characterized by stable production at higher costs, larger domestic consumption at higher prices and sharply reduced exports. Even though poultry and eggs were removed from Argentine Trade Promotions Institute' control in the latter part of 1949 and increased preferential exchange was granted, local prices are not attractive to foreign buyers.

The indigenous production of eggs last year is estimated at about equal to that of 1948. An increase in the quantities domestically consumed, however, made it necessary to import 20,000 cases of shell eggs from the Netherlands and Belgium for the last winter season (April-July). Egg production in 1950 is not expected to change significantly but large stocks of shell eggs in frigorificos is expected to cover production deficits.

Exports of shell eggs during 1949 were seriously curtailed due to the domestic shortage. Two separate export quotas of 50,000 cases each were granted during the year, but only 51,200 cases were shipped. Switzerland and Italy took 39,700 and 11,500 respectively. Exports in previous years normally amounted to 200,000 cases. Shipments to Switzerland were at a price of 48 cents per dozen as based upon the exchange rate effective October 1949, which was more favorable for trade. Exports of dried eggs during 1949 were 485 tons.

The 1949 production of chickens and hens is estimated at approximately 10 percent greater than the previous year, and the domestic consumption probably amounted to 20 million birds. Since there has never been a poultry census in Argentina, the forecasts can only be on a percentage basis. There were no exportations of chickens and hens in 1949.

Chickens for market in 1950 are expected to be about the same as 1949 although they may be marketed somewhat earlier than usual due to current strong prices for poultry, increased production costs, coupled with a shortage of corn in important chicken raising zones.

Dressed chickens for export are being quoted at 53 cents per pound f.o.b. Buenos Aires. Currently there is little if any foreign interest in poultry meat.

The anticipated increase in the turkey crop failed to materialize. Thus production was about equal to the preceding year. Turkey producers who normally depend considerably on export market, were in a weak position since the United Kingdom did not enter the market in 1949 and exports amounted to only 285 tons. The limited export market was partially offset by the increasing popularity of turkey meat in Argentina.—Foreign Crops and Markets, U.S. Dept. Agr.

[1] I.A.P.I. Commission was 20 percent on the f.o.b. price for export chickens and 7.5 percent for turkeys.

HATCHING EGGS FLOWN FROM THE UNITED STATES TO EGYPT AND GREECE

In the February issue of the "American Magazine" a feature article entitled "Fast Freight on Wings" shows the loading of a TWA plane with a shipment of 7500 hatching eggs destined for the Government of Egypt which were purchased from the Agricultural Company of Pan America of Guilford, Conn., U.S.A. Mr. R. Walter Bishop, General Manager of the Agricultural Company of Pan America stated that the air transportation on this single big shipment amounted to close to four thousand dollars.

A recent shipment of 3000 eggs to Greece was distributed and resulted in hatchabilties of 45 to 60%. The hatchability depends largely upon the distribution and incubation conditions after arrival. A number of shipments to Thailand showed good results, i.e. 60-65% hatch or better. Typically the reports have been 60 up to 80% of all eggs.

When air shipments were first started there was considerable breakage. Now due to special packing there is practically no breakage.

During the last four years the Agricultural Company of Pan America has successfully organized shipments of hatching eggs, chicks, poultry breeding stock, live stock, and agricultural equipment and supplies to fifty different countries in all parts of the world, including about twenty foreign governments.

One of the senior students at the American Farm School at Salonica, Greece with White Leghorn chicks hatched from eggs sent by air from the Agricultural Company of Pan America, Guilford, Conn., U.S.A.

REVIEW OF POULTRY PUBLICATIONS

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GENETICS

HICKS, AMP F. JR., and I. MICHAEL LERNER. *(U. California, Berkeley.)* HEREDITARY CROOKED TOES IN CHICKENS. *Poultry Sci. 28:* 625-626. 1949.—Results of selection for high incidence of crooked toes in day-old chicks are given in brief. The similarity of this genetically detd. defect to others reported to be of non-hereditary nature is pointed out.—Authors. (Biological Abstracts)

HUTT, F. B., and R. K. COLE. *(Cornell U., Ithaca, N.Y.)* DISEASE RESISTANT. *Amer. Egg and Poultry Rev. 10:* 40. 1949.—A preliminary report on the development of a strain of birds resistant to the avian leukosis. Diseases included are "big liver disease," "grey eye," "range paralysis" and others. The resistant strain produced more eggs of larger size and increase in body wt. Further tests are under way.—*H. G. Lundquist.* (Biological Abstracts)

JARDIM, W. R., and ARMANDO BERGAMIN. COMPARACAO DAS RACAS RHODE ISLAND RED, LIGHT SUSSEX E SEU MESTICO. OVOS, PINTO E FRANGOS. [EGGS, PULLETS AND CHICKENS OF R. I. RED, LIGHT SUSSEX AND HYBRIDS.] *An. Escola Superior Agric. "Luiz de Queiroz" 4:* 438-449. 1947.—Eggs of Light Sussex were heavier; L. Sussex matured early; and no heterosis was manifested in the crosses.—*W. G. Houk.* (Biological Abstracts)

KING, D. F., and G. J. COTTIER. DECREASING ADULT MORTALITY IN THE DOMESTIC FOWL BY BREEDING. *(Alabama Agricultural Experiment Station 58th and 59th Annual Reports,* page 38).—Since 1935 there has been underway at this Station a project designed to develop a strain of single comb White Leghorns that would be capable of resisting diseases. The adult mortality of the pullets housed each year from 1935 to 1947 was: 89, 91, 54, 48, 27, 41, 32, 47, 39, 32, 22, and 18 percent. Variations from year to year were partly due to different degrees of exposure. (Experiment Station Record)

KING, D. F., S. A. EDGAR, and L. W. JOHNSON. BREEDING AND IMMUNIZING CHICKENS FOR RESISTANCE TO COCCIDIOSIS. *(Alabama Agricultural Experiment Station 58th and 59th Annual Reports,* page 40).—First generation offspring of parents selected as being resistant to cecal coccidiosis showed a 10 percent greater livability when exposed to the disease than offspring from unselected parents. The resistant offspring also showed a greater rate of growth for a 14-day period following infection than the offspring from unselected stock. (Experiment Station Record)

POTTER, J. H. *(U. Chicago.)* DOMINANCE RELATIONS BETWEEN DIFFERENT BREEDS OF DOMESTIC HENS. *Physiol. Zool. 22:* 261-280. 1949.—The dominance relations of mature hens of the following 7 breeds were observed in 12 flocks: White Leghorn, Brown

Red Game, R. Is. Red, White Wyandotte, Brown Leghorn, Light Brahma, and White Cochin Bantam. The White Leghorns were the most dominant of the tested hens, the White Cochin Bantams the least; the behavior of the intermediate breeds were less clear cut, and some overlapping of their dominance scores existed. 834 decisive initial encounters were staged between hens of the different breeds which were strangers to each other. The agreement between dominance in flocks and dominance in initial pair contacts had statistical validity for 17 of the 21 comparisons. Known factors did not fully account for observed differences in dominance between hens of different breeds. These breed differences are probably based on genetic factors. Hens of the same breed were obtained from the same source and were presumably of the same strain. Hence, any genetic differences can be interpreted only as strain differences and are not necessarily typical of the breeds in general.—*J. H. Potter.* (Biological Abstracts)

TORRES, A. di PARAVICINI, and E. A. GRANER. RACA DE GALHINAS "PIRICICABA." I. HERETARIEDADE DOS CARACTERES PESCOCO PELADO E PLUMAGEM PRETA. ["PIRICICABA" HENS. I. INHERITANCE OF NAKED NECK AND BLACK PLUMAGE.] *An. Escola Superior Agric. "Luiz de Queiroz" 4(57):* 86-93. Illus. 1947.—Naked neck and black plumage proved to be due to single genes that segregate independently.—W. G. Houk. (Biological Abstracts)

WARREN, D. C., and HERMAN SMITH. *(Kansas Agric. Expt. Sta., Manhattan.)* THE ORIGIN OF BREEDS OF CHICKENS. *Jour. Agric. Res. 78:* 397-403. Illus. 1949.—There are rather wide differences in the structure of the skull at the point of union of the 2 frontal bones of breeds and vars. of poultry. The suture between the 2 frontals may be virtually smooth, sharply grooved, or ridged. There is also considerable variation in the depth of the groove. The representatives of the Asiatic and Mediterranean classes showed considerable difference in the range of variation. Of the 5 classifications, extremely grooved, moderately grooved, slightly grooved, flat, and ridged, the Mediterraneans showed all types but relatively little grooving of any degree. The Mediterraneans had considerable ridging of the skull. The Asiatic group possessed no ridge but were distinguished by a high incidence of grooves, some of which were very deep. Although there was considerable overlapping, Mediterraneans have relatively larger combs, but this would hardly seem to be responsible for the structural differences in the skull. No observed differences in skull structure lend support to the contention that the Mediterranean group is basically different from other groups in origin. This study did not reveal any obvious differences in the structure of the foramen magnum as reported by Tegetmeier.—*Auth. summ.* (Biological Abstracts)

BREEDING TO IMPROVE MEAT QUALITY IN CHICKENS. *(Report of the Chief of the Bureau of Animal Industry Agricultural Research Administration 1949,* page 27).—The male progeny of the Dark Cornish in 1947 had an average angulation of 49.9°, and the females 49.2° at 12 weeks of age.

There were similar increases in the breast development of the New Hampshire progeny. In 1947 the males had an average breast angulation of 44.6° and the females 43.6° at 12 weeks, whereas in 1948 the males at 10 weeks had an average of 47.6° and the females 47.8°. (Experiment Station Record)

ORIGINATION OF NEW BREEDS. *(Report of the Minister of Agriculture for the Dominion of Canada for the Year Ended March 31, 1949,* page 173).—The three new breeds which are being originated at the Central Farm are progressing favourably.

The Broad Breasted White breed is making satisfactory progress. The meat quality which is an important feature of the breed is excellent. Production of eggs is also improving as is uniformity of type. Crosses of this meat breed with standard general-purpose fowl have

been shown to decidedly improve the meat quality of the other breeds particularly at roaster age. Tests showed that the hatchability from such crosses was better than for the Broad Breasted White, in fact equal to the other breeds in the cross. (Experiment Station Record)

PHYSIOLOGY

ATHIAS, MARCK. OS PERUS. CARACTERES GERAIS E DISTRIBUICAO GEOGRAFICA—ESPECIES E RACAS—DIFERENCAS SEXUAIS E SEU CONDICIONAMENTO NO PERU VULGAR. [TURKEYS, GENERAL CHARACTERS AND GEOGRAPHICAL DISTRIBUTION, SPECIES AND RACES, SEXUAL DIFFERENCES AND THEIR CONDITIONING IN THE COMMON TURKEY.] *Biol. Soc. Portuguesa Ciene. Nat. 15:* 169-180. Illus. (1944/1947)[1947].—There is a general review of early historical references to the turkey, and brief discussion of the distribution and races. The main part of the paper is a discussion of the effects of castration on the external appearance of the bird. (Biological Abstracts)

BOOKER, EDWARD E., and PAUL D. STURKIE. *(Agric. Expt. Sta., New Brunswick, N. J.)* THE EFFECT OF THYROXINE AND IODINATED CASEIN ON THE DEVELOPMENT OF THE CHICK THYROID. *Poultry Sci. 28:* 147-148. 1949.—1 μg of thyroxine or 33 μg. of iodinated casein, when injd. into incubating eggs on the 4th day, reduces the thyroid size of the subsequently hatched chicks, as it does when admd. directly to the chick or hen. The action of iodinated casein is similar to that of thyroxine when injd. at equal thyroxine equivalents, indicating that iodinated casein has no action on the thyroid other than that exerted by the thyroxine which it contains. It would appear that the thyroid enlargement in chicks from hens fed thyroprotein is not due to the passage of a thyroid-active substance from the hen to the egg.—*Authors.* (Biological Abstracts)

BOUVIER, G., D. SARTORI, and F. A. TORRES. *(Inst. Biol., Sao Paulo, Brazil.)* ENSAIOS DE CASTRACAO QUIMICA DE FRANGOS. [TRIALS IN CHEMICAL CASTRATION OF CAPONS.] *Biologico* [*Sao Paulo*] *15:* 31-34. Illus. 1949.—Tablets of stilbestrol, 0.015 g., inserted under the skin of the neck, resulted in reduction of the combs and complete atrophy of the testes in 4 male White Leghorn cockerels within 2.5 months. Similar treatment of 10 birds with dimethylethylalenolic acid showed no practical effect. The treated birds are said to present no danger for human consumption.—*J. L. Cartledge.* (Biological Abstracts)

COMAR, C. L., and J. CLYDE DRIGGERS. *(Florida Agric. Expt. Sta., Gainesville.)* SECRETION OF RADIOACTIVE CALCIUM IN THE HEN'S EGG. *Science 109(2829):* 282. 1949.—Investigations were made of the secretion of radioactive Ca^{45} in the hen's egg. One mg. of Ca as a soln. of the chloride with an activity of 15 μc was admd. to the lower esophagus of the fasted bird. For 20 days after dosage, each egg laid was analyzed for total Ca and Ca^{45} uptake in the yolk, white and shell. Results indicated the ability of the hen to incorporate a large percentage of ingested soluble Ca into the shell. Calculated from the total dietary Ca intake and output, a max. of from 60-75% of the Ca in the egg reached there directly from the ingested Ca, the remainder probably being drawn from the body stores.—*Mathilde Salowey.* (Biological Abstracts)

EL-IBIARY, H. M. BODY CONFORMATION IN TURKEYS. *Poultry Sci. 27:* 825-826. 1949—Coeffs. of partial correlations between 5 characters of body conformation are calculated with variation in body wts. eliminated. For 28-week-old turkeys, those with the wider breasts are likely to have slightly shorter shank than narrower-breasted birds of the same wt.—*H. M. El-Ibiary.* (Biological Abstracts)

FRANKLIN, A. L., E. L. R. STOKSTAD, and T. H. JUKES. *(Amer. Cyanamid Co., Pearl River, N. Y.)* RESPONSE TO DIETHYLSTILBESTROL IN FEMALE CHICKS AS INFLUENCED BY FOLIC ACID DEFICIENCY INDUCED BY AN ANTAGONIST. *Poultry Sci. 27:* 662. 1948.—An abstract. (Biological Abstracts)

FRAPS, RICHARD M. *(U. S. Dept. Agric., Beltsville, Md.)*, CHARLES W. HOOKER, and THOMAS R. FORBES. *(Yale U., New Haven, Conn.)* PROGESTERONE IN BLOOD PLASMA OF COCKS AND NONOVULATING HENS. *Science 109 (2837):* 493. 1949.—Tests made on plasma from males and reproductively quiescent hens yielded positive and typical progesterone reactions, the first direct evidence of progesterone in the blood stream of normal males in any species.—Mathilde Solowey. (Biological Abstracts)

GRANER, E. A., and A. P. TRIVELIN. ANALISE DO TAMANHO E DA FORMA DO OVO EM GALINHAS DAS RACAS RHODE ISLAND RED E LIGHT SUSSEX E DO HIBRIDO ENTRE ESSAS DUAS RACAS. [FORM OF HEN'S EGGS.] *An. Escola Superior Agric. "Luiz de Queiroz" 4:* 394-402. 1947.—Uniformity prevails in eggs from the same bird; the correlation coeff. between major and minor diam. of the eggs is small, and short eggs are dominant over long; hybrids produce rounder eggs than either parent type; and quantitative genes are indicated—*W. G. Houk.* (Biological Abstracts)

JARDIM, WALTER RAMOS. DETERMINACAO DO SEXO EM PINTOS DA RACA RHODE ISLAND RED. [SEX DETERMINATION IN PULLETS.] *An. Escola Superior Agric. "Luiz de Queiroz" 4:* 380-388. Illus. 1947.—Females are separated on the basis of the light coloration of the anterior part of the wing, down on the leg immediately above the tibiotarsal joint, and the dark spot that sometimes occurs near the posterior angle of the eye.—*W. G. Houk.* (Biological Abstracts)

LEROY, P. *(Coll. France, Paris.)* EVOLUTION INTERSEXUEE DE GONADES FEMELLES EMBRYONNAIRES TRANSPLANTEES SUR CHAPONNE ADULTS. *Ann. Endocrinol. 9:* 459-463. 1948.—The grafting of 13 ovaries of 16-day embryos into the abdominal cavity of 1 adult capon produced an early masculinization of the comb which persisted throughout the study (4 mos.) and a later feminization of the plumage which lasted about 2 mos. A biopsy of the graft made at the beginning of feminization revealed only degenerating follicles and syncytial masses of tissues which resembled the medullary cords of the adult female gonad.—*J. C. Stickney.* (Biological Abstracts)

McCARTNEY, MORLEY, G., and C. S. SHAFFNER. *(U. Maryland, College Park.)* CHICK THYROID SIZE AND INCUBATION PERIOD AS INFLUENCED BY THYROXINE, THIOURACIL, AND THYROPROTEIN. *Poultry Sci. 27: 674. 1948.—An abstract.* (Biological Abstracts)

MORENG, ROBERT E., and C. S. SHAFFNER. *(U. Maryland, College Park.)* A THIOURACIL-THYROPROTEIN TREATMENT FOR FATTENING POULTRY. *Poultry Sci. 28:* 504-510. 1949.—Comparable groups of 11- to 13-wk.-old New Hampshire cockerels were fed a standard boiler ration to which thiouracil was added at a level of 0.2% of thiouracil plus small amts. of thyroprotein. An optimum degree of hypothroidism for growth and fattening was reached when 1 g. of thyroprotein was fed in combination with 0.2% thiouracil for a 4- or 5-wk. period. This treatment not only resulted in gains that were comparable with or better than those of the controls but also improved market grade. Thioracil when added to the ration at very low levels (0.05 and 0.012%) did not depress rate of growth, but was not as effective as the thiouracil-thyroprotein treatment in improving market grade. Thyroid wt. was considerably increased by 0.2% thiouracil over that of the control. 1 g. of thyroprotein plus 0.2% thiouracil resulted in thyroid glands almost twice the median size of the glands in birds fed thiuracil alone at the 0.2% level. Testis size and comb area were generally de-

pressed in treated groups. The improved market grade was consistently accompanied by an increase in liver size.—*Auth. summ.* (Biological Abstracts)

NALBANDOV, A. V., and M. F. JAMES. THE BLOOD-VASCULAR SYSTEM OF THE CHICKEN OVARY. *The American Journal of Anatomy, 85:* 347. 1949.—The short ovarian artery usually originates from the left renolumbar artery, but sometimes branches directly from the dorsal aorta just anterior to the left renolumbar artery. This artery divides into many branches.

The venous system of the follicle consists of three layers: (1) The innermost layer forms a venous capillary network in the theca layer of the follicle; it is the venous counterpart of the arterial capillary network. (2) This capillary network is drained by venules into the exceedingly complex middle venous layer lying peripheral to the first. (3) The third venous layer consists of a few large veins which encircle the follicle and drain it through the stalk. (Experiment Station Record)

NOVIKOFF, MORRIS, and H. S. GUTTERIDGE. *(Central Exptl. Farm, Ottawa.)* A COMPARISON OF CERTAIN METHODS OF ESTIMATING SHELL STRENGTH. *Poultry Sci. 28:* 339-343. Illus. 1949.—Strength of egg shell is important from the standpoint of marketing of the egg with shell intact and also because it is an index of high or low quality in other characteristics of the egg, such, for example, as quality of albumen, hatchability and viability of the chicks hatched therefrom. Methods of measuring shell strength were contrasted comparing specific gravity, resistance to puncture and moisture loss with actual breakage through the use of instrument built for the purpose and illustrated. Specific gravity and resistance to puncture were of similar value as indices of strength, the former having the advantage of greater precision by reason of low variability. Both methods have the advantage over other methods in that the egg remains intact under such treatment and is not harmed thereby. Moisture loss was shown to be a poor measure of resistance to breakage.—*H. S. Gutteridge.* (Biological Abstracts)

OLSEN, M. W., and B. H. NEHER. *(U. S. Dept. Agric., Beltsville, Md.)* TIME AND PLACE OF FERTILIZATION OF THE HEN'S OVUM. *Poultry Sci. 27:* 679. 1948.—*An abstract.* (Biological Abstracts)

QUISENBERRY, J. H., and W. F. KRUEGER. *(Texas A. and M. Coll., College Station.)* EFFECTS OF FEEDING VARIOUS COMBINATIONS OF PROTAMONE, OESTROGENS AND THIOURACIL ON GROWTH AND FATTENING OF BROILERS AND FRYERS. *Poultry Sci. 27:* 681. 1948.—*An Abstract.* (Biological Abstracts)

REGNIER, V., and F. CARIDROIT. LA PHYSIOLOGIE DE LA CRETE. RECHERCHES SUR LA TENEUR EN LIPIDES DE LA CRETE DU COQ, DE LA POULE ET DU CHAPON. [THE PHYSIOLOGY OF THE COMB. RESEARCHES ON THE COMB-LIPIDS LEVEL OF THE COCK, OF THE HEN AND OF THE CAPON.] *Rev. Sci. [Paris] 81:* 33-35. 1943.—In spite of very different appearances, the combs of cocks and capons have similar concns. in total lipids. However, the combs of the capons contain more insaponifiable and chiefly fatty acids than those of the cocks; it is there a characteristic of the lipid metabolism of the capon of which tendency to fattening is well known. On the other hand, the comb of the capons contains less cholesterol, and its lipocytic coefficient (100 x cholesterol: fatty acids) is lower than that of the cock. The ratios of water-level by g. of dry tissue to lipocytic coefficient ,are equal, allowing for exptl. errors (about 1.25). Very different is the comb of the hens: it contains less total lipids and fatty acids, but more cholesterol; its lipocytic coefficient is high (5.8); and the ratio of water-level by g. of dry tissue to lipocytic coefficient is low (0.39). This lipid metabolism of the comb of the female is interesting, for the hormone conditioning the comb of the hens, is not well known: it is not estrogen, and not testosterone in small amt. but an ovarian hormone, specificially female, not yet known, but different from testosterone.—*J. J. Symoens.* (Biological Abstracts)

ROTHCHILD, IRVING, and R. M. FRAPS. *(U. S. Dept. Agric., Beltsville, Md.)* THE INTERVAL BETWEEN NORMAL RELEASE OF OVULATING HORMONE AND OVULATION IN THE DOMESTIC HEN. *Endocrinology 44:* 134-140. 1949.—Mature, regularly laying domestic hens were hypophysectomized at intervals ranging from 10 hrs. to 2 hrs. before an expected ovulation. The expected ovulation in 119 cases was that of an initial member of a clutch, and in 41 cases that of an intraclutch or terminal member. The percentage of birds ovulating the expected ovum increased with the decrease in interval from hypophysectomy to actual or expected ovulation, and the most frequent interval between apparent release and ovulation was of the order of 4-6 hrs. and was not related to position in the clutch.—*Authors.* (Biological Abstracts)

ROTHSCHILD, IRVING *(U.S.D.A., Beltsville, Md.)*, and R. M. FRAPS. THE EFFECT OF HYPOPHYSECTOMY ON THE OVULABILITY OF THE OVARIAN FOLLICLE OF THE DOMESTIC HEN. *Jour. Clin. Endocrinol. 8:* 615. 1948.—*An abstract.* (Biological Abstracts)

SCRIMSHAW, NEVIN STEWART, WARREN ELLSWORTH PORTER, and MARY WARE SCRIMSHAW. *(U. Rochester, N. Y. C.)* THE DISTRIBUTION OF THIAMINE IN THE EMBRYONATED HEN EGG. I. THE CONTENT OF THE WHOLE EMBRYO. *Jour. Nutrition 38:* 237-246. 1949.—The changing thiamine concn. of the embryo and the remainder of the egg contents was detd. by the macro fermentation method for embryonated eggs of White Leghorn fowls. The total thiamine concns. of the egg contents does not change greatly during incubation. However, by correcting for the loss of wt. of the egg during development, a drop of about 20% is found and attributed to the needs of developmental metabolism. The concn. of thiamine in the embryo gradually increases in an exponential fashion. The concn. in the remainder of the egg rises a little after the 7th day and begins to drop rapidly after the 15th day. The thiamine content of the remains as represented by the spare yolk of the day-old chick was found to have dropped to about 20% of the original concn. in the egg and about 7% of the original concn. in the yolk.—*Auth.* (courtesy Wistar Bibl. Serv.).

SCRIMSHAW, NEVIN STEWART, WARREN ELLSWORTH PORTER, and MARY WARE SCRIMSHAW. *(U. Rochester, N.Y.C.)* THE DISTRIBUTION OF THIAMINE IN THE EMBRYONATED HEN EGG. II. THE CONTENT OF EMBRYONIC TISSUES. *Jour. Nutrition 38:* 267-273. 1949.—The thiamine concn. and content of the organs and tissues of 15-day and 18-day chick embryos and of day-old chicks were detd. by the macro fermentation method. In the 18-day embryo the liver showed the highest concn. (4.5 μg./100 g.), followed by kidney (2.4), brain (1.8), muscle (1.8), gastrointestinal tract (1.0) and heart (1.0). The embryo at this stage showed a concn. of 1.1., the yolk 1.5, with the membranes and fluids intermediate. The corresponding values for the 15-day embryo are similar but those for the 1-day chick are generally lower. The total content is greater in the brain at 15 days than in the liver (1.5 as compared to 1.0 μg.). By 18 days the liver contains the most thiamine (2.0 μg.), followed by brain (1.4), gastrointestinal tract (1.3), kidney (0.3), and heart (0.1). In the day-old-chick, liver and gastrointestinal tract have high thiamine contents (3.2 and 2.9), followed by brain 1.1), yolk (0.5) and heart (0.3). These values are compared with those previously reported for embryo and adult tissues. —*Auth.* (courtesy Wistar Bibl. Serv.).

STURKIE, P. D., J. A. PINO, J. I. WEATHERWAX, A. J. DONNELLY, and G. M. DORRANCE. *(Amer. Oncol. Hosp., Philadelphia.)* EFFECT OF X-RAYS ON FERTILITY IN WHITE LEGHORN MALE CHICKENS TREATED BEFORE PUBERTY. *Radiology 52:* 112-117. 3 fig. 1949.—Male white Leghorn chicks 4-6 weeks of age were irradiated over an area of the body including gonads, adrenals, and parts of the kidney. Doses: 1200, 1600, 2100 and 2800 r given in equal doses of 4 weekly treatments within 2 weeks and 5600 and 8400 r given in 4 weekly

treatments within 3 weeks. 10 animals were exposed in each group, 2-4 of which were killed about 4 weeks after the last exposure for histologic examination. The rest were mated. All of the animals receiving more than 1600 r were sterile. Irradiation had no effect on comb size or mating habit. The testes of the irradiated animals were reduced in size, but the histological state of the testes was found not always a reliable criterion of fertility.—*F. Ellinger.* (Biological Abstracts)

SWIEZAWSKA, K. *(U. Krakow, Poland.)* INFLUENCE OF AN INCREASE IN THE OSMOTIC PRESSURE UPON THE WHITE YOLK SPHERES OF THE HEN'S EGG CONTAINING TWO OR MORE DROPS OF FAT. *Bull. Internat. Acad. Polonaise Sci. et Lettr. Cl. Sci. Math. et Nat. Sér. B: Sci Nat.* [*Zool.*] *1948:* 201-212. Illus. 1949. —Increase in osmotic pressure causes a diminution of spheres. The contents of spheres become turbid, with a disappearance of fat drops. If the expt. is continued the contents granulate and the fat drops reappear again as negatives. Before the disappearance the fat drops contained in a separate sphere unite. A rise in temp. enhances the confluence of fat drops; neutral red prevents the union.—*H. Szarski.* (Biological Abstracts)

TAIBEL, ALULAH M. *(Poultry Expt. Sta., Ravigo, Italy.)* INFLUENZA DELLA ASPORTAZIONE DELLA CRESTA E DEI BARGIGLI SUL PESO DEI TESTICOLI E SULLA SPERMATOGENESI. [EFFECTS OF REMOVING THE COMB AND THE WATTLES ON THE WEIGHT OF TESTICLES AND ON SPERMATOGENESIS.] *Ann. Sperim. Agrar.* [*Rome*] *3:* 327-342. 1949.—Removing the comb and the wattles of White Leghorn cocks about 5 months old led to slight changes in wt. of testes and no changes in plumage.—*W. Bally.* (Biological Abstracts)

TAIBEL, A. M. ESPERIMENTO DI BURSA-TIMECTOMIA IN GALLUS GALLUS DOMESTICUS L. [EXPERIMENT ON CONTEMPORARY EXTIRPATION OF BOTH BURSA FABRICII AND THYMUS IN DOMESTIC FOWL. *Ric. Biol. 39:* 164-189. 1947.—Extirpation of both Bursa Fabricii and thymus in chickens did not affect growth rate, sexual maturity, egg deposition or mortality.—*L. Tentori.* (Biological Abstracts)

TORRES, A. DI PARAVICINI. COMPORTAMENTO DA RACA LIGHT SUSSEX EM PIRICICABA. [OBSERVATIONS ON LIGHT SUSSEX.] *An. Escola Superior Agric. "Luiz de Queiroz" 4:* 404-409. 1947.—3 yrs. of observation indicate that, compared with R. I. Reds, Light Sussex is faster growing, heavier, earlier in maturing, shows greater broodiness and lays larger eggs.—*W. G. Hoak.* (Biological Abstracts)

TORRES, A. DI PARAVICINI. DETERMINACAO DO SEXO DO PINTO PELA FORMA DO OVO. [SEX DETERMINATION IN PULLETS FROM EGG FORM.] *An. Escola Superior Agric. "Luiz de Queiroz" 4:* 308-312. 1947.—No correlation was found between egg form and sex.—*W. G. Hoak.* (Biological Abstracts)

WHEELER, ROBERT, S., EDMUND HOFFMAN, and CLIFFORD W. BARBER. *(U. Georgia, Athens.)* THE EFFECT OF THIOURACIL-INDUCED HYPOTHYROIDISM ON THE RESISTANCE OF CHICKS EXPERIMENTALLY INFECTED WITH E [IMERIA] TENELLA. *Poultry Sci. 27:* 685. 1948.—An abstract. (Biological Abstracts)

CHANGES SHOWN IN PROGESTERONE LEVELS IN THE BLOOD PLASMA OF THE OVULATING HEN, (Report of the Chief of the Bureau of Animal Industry Agricultural Research Administration 1949, pages 30-31.)—

Results indicate that during certain phases of the ovulatory cycle the plasma of the hen may contain almost as much progesterone as does plasma of the pregnant mammal.

The results reorted here are believed to be the first direct evidence of the occurrence of progsterone in the blood stream of normal males of any species. (Experiment Station Record)

DAY-OLD CHICKS SURVIVE AT SUSTAINED LOW BAROMETRIC PRESSURES. *(Report of the Chief of the Bureau of Animal Industry Agricultural Research Administration,* 1949. page 31.)—

Tests were carried out to determine the maximum altitudes at which day-old chicks might safely be handled by commercial air lines. Three factors were studied, corresponding to simulated rate of ascent, time the chicks were held at high altitudes and rate of descent. All except a few of the tests were carried out under continuous and adequate air flow. Under these conditions, day-old chicks can withstand reduced atmospheric pressure corresponding to altitudes of 20,000 feet for 16 or 20 hours.

Some chicks were found dead upon opening the decompression chamber in five tests carried out at a simulated altitude of 25,000 feet and at 90°F. (Experiment Station Record)

EGG CHARACTERISTICS AFFECT HATCHABILITY, *Report of the Chief of the Bureau of Animal Industry Agricultural Research Administration,* page 30, 1949.—The hatchability of fertile eggs showing these undesirable characteristics was as follows: Small eggs, 80 percent; large blood spots, 71.5 percent; extra large eggs, 70.8 percent; misplaced air cells, 68.1 percent; misshapen eggs, 48.9 percent; cracked eggs, 53.2 percent; eggs with poor shells, 47.3 percent; and loose air cells, 32.4 percent. (Experiment Station Record)

ESTROGENS IN IMPROVING QUALITY OF DRESSED POULTRY. *Report of the Minister of Agriculture for the Dominion of Canada for the Year Ended March 31, 1949,* page 175.—

Research with sex hormones and particularly the so-called female sex hormones or estrogens has been in progress at Ottawa for some time and this work was very actively pursued during 1948. Up to the present, the usefulness of these estrogens has been principally as an aid to improvement of market quality of dressed poultry. Their value in this direction is unquestioned as they produce a silky, semi-opaque quality of skin which gives the carcass a most attractive appearance. This was thought to be brought about by a greatly increased deposition of fat. Research at this Division has shown, however, that while there is usually some increase in deposition of fat, the effect is principally due to the feminizing action of the hormone which greatly thickens the skin giving the skin quality characteristic of the female of most species. The increase in fat which did occur was found to be due principally to increased feed intake when these hormones were used. (Experiemnt Station Record)

NUTRITION

ALMQUIST, H. J. WHAT IS A GOOD FEED? *Hatchery and Feed,* February, 1950, 24: 40.—

"Protein-poisoning" that we still hear talked about, is a well-exploded myth. It has been debunked with almost every important species of animal. The body has a large capacity to handle protein.

What the observers of alleged protein poisoning have seen is the effect of borderline deficiencies of vitamins or other factors, aggravated by the faster growth, caused by higher protein, and leading to earlier breakdown, due to a lack of the particular factor. This is not "protein-poisoning" or "burning-up"—it is induced malnutrition.

Practically no feedstuff has less than 10 or 11 percent indigestible, components, although several have only about one percent fiber. In general, the total indigestible components are correlated with crude fiber content. However, there are some interesting differences. Corn, with a two percent fiber, has as much total indigestibles as soybean meal, with six percent fiber. Alfalfa meal, with 18 to 25 percent fiber, has no more

total indigestibles than wheat bran, with only 10 percent fiber. Barley, with about the same fiber as soybean meal, has almost twice as much indigestibles. (Experiment Station Record)

BACLIG, JOSE B., and F. M. FRONDA. *(University of the Philippines, College of Agriculture, College, Laguna).* A FURTHER STUDY ON THE INFLUENCE OF IPIL-IPIL (LEUCAENA GLAUCA LINN.) SEED MEAL IN A RATION FOR GROWING CHICKS. *Philippine Agriculturist 32:* 329-332.—The chicks that received a ration containing 5 per cent ipil-ipil seed meal did not grow so fast and were not so uniform in size as those that did not receive ipil-ipil seed meal in their ration. The ration with the ipil-ipil seed meal was not so well relished by the chicks as the check ration. The percentage of mortality was higher in the lot that received the ration with ipil-ipil seed meal than in the control lot.—*F. M. Fronda.*

BERGAMIN, ARMANDA. RACAO DE MARRECAS PARA POSTURA. RACAO BALANCEADA X RACAO GROSSEIRA, BARATA [BALANCED AND CHEAP RATIONS AND EGG PRODUCTION IN DUCKS.] *An. Escola Superior Agric. "Luiz de Queiroz" 4:* 460-463. 1947.—Substitution for part of the balanced ration resulted in greatly reduced egg production.—*W. G. Houk.* (Biological Abstracts)

BIRD, H. R. ANIMAL PROTEIN FACTORS. *Flour & Feed,* December, 1949, 50: 12.—

1. Is Vitamin B_{12} the Animal Protein Factor?

It is not the only animal protein factor, but it is the most important one from a practical standpoint. If the alfalfa meal and butyl fermentation solubles are left out and riboflavin added, or if a purified diet is used instead of one composed of natural ingredients, then pure vitamin B_{12} is beneficial but it doesn't do the whole job. There is evidence for the existence of at least two other unknown factors. According to work at Cornell, both of these factors are present in fish meal and in at least one sample of brewers yeast. One is found in dried whey and to a certain extent in soybean meal; the other is found in liver paste. There is also evidence for the existence of unknown factors in alfalfa meal, distillers solubles, and butyl fermentation solubles, which may or may not be identical with the factors mentioned above.

When animal protein supplements are replaced, care must be taken to replace the protein, calcium, and phosphorus as well as the vitamins.

The following vitamin B_{12} potencies of some of the best sources of this vitamin among feedstuffs were determined by a chick assay method and are expressed in micrograms per gram; fish meal 0.24, meat meal 0.08, fish solubles 0.75-0.98, crab meal 0.33.

Vitamin B_{12} has been shown to be required for the growth of young pigs, chickens, and turkeys and to be required for reproduction in chickens.

In experiments at Beltsville pullets on range were not adversely affected if all vitamin B_{12} supplements were removed from their diet when they were eight weeks old. Vitamin B_{12} supplements are not required in laying mashes unless the eggs are intended for hatching. (Experiment Station Record)

BORCHERS, RAYMOND. *(Agric. Expt. Sta., Lincoln, Nebr.)* CASTOR BEAN OIL MEAL. I. DESTRUCTION OF THE TOXIC FACTOR. *Poultry Sci. 28:* 568-570. 1949.—Castor bean oil meal was extremely toxic when fed to chicks either untreated or after steaming for 15 min. Autoclaving or 95% ethanol refluxing of castor bean oil meal destroyed the ricin but such meal did not give normal growth when fed to chicks. Repeated extraction of castor bean oil meal by hot 95% ethanol resulted in a meal which gave normal chick growth.—*Auth. summ.* (Biological Abstracts)

CLARK, T. B., A. H. Van LANDINGHAM, and C. E. WEAKLEY, JR. *(U. West Virginia, Morgantown.)* SOYBEAN OIL MEAL IN POULTRY RATIONS. II. SOYBEAN OIL MEAL ALONE AND IN

COMBINATION WITH MEAT SCRAP OR CORN GLUTEN MEAL. *Poultry Sci. 28:* 521-529. 1949.—Both growth and metabolism trials were conducted on diets composed of whole-grain cereals, corn, wheat and oats, supplemented with soybean oil meal alone and in combination with meat scrap or corn gluten meal. All test diets contained 16% total protein. Half of the total protein was supplied by the cereal basal and the other half by the protein concentrate. Good growth and a high percentage of the protein was utilized when the basal diet was supplemented with a high quality soybean oil meal. Replacing the protein from soybean oil meal with that from meat scrap did not make a significant difference in the rate of growth or in the percentage utilization of the protein. There was a decrease in the rate of growth and the amt. of protein utilized when as much as half of the protein supplied by soybean oil meal was replaced by an equal amt. from corn gluten meal. Storing soybean oil meal for 2 yrs. under laboratory conditions resulted in a decreased utilization of protein with a consequent reduction in growth even when supplemented with meat scrap.—*Auth. summ.* (Biological Abstracts)

COUCH, J. R., M. L. SUNDE, W. W. CRAVENS, C. A. ELVEHJEM, and J. G. HALPIN. *(U. Wisconsin, Madison.)* EFFECT OF OATS, OAT PRODUCTS AND FAT ON THE INTESTINAL SYNTHESIS OF BIOTIN IN MATURE FOWL. *Jour. Nutrition 37:* 251-261. 1949.—Laying hens were fed a low biotin diet with sucrose as the carbohydrate. The diet was complete with respect to all known nutrients with the exception of biotin. Evidence is presented to show that ground whole oats and oat groats supported the synthesis of biotin, in the mature fowl when used to replace either 20 or 40% of sucrose in a low biotin diet. The synthesis, absorption and deposition of the vitamin in the egg were directly related to the level of whole oats or oat groats used. The results obtained indicate that whole oats stimulated the synthesis of the vitamin to a greater extent than did the oat groats. Oat hulls did not favor the intestinal synthesis of biotin, under the conditions of this expt. Dextrin was used as the carbohydrate in a low biotin diet with 5% fat and with 20% fat. These diets were fed to laying hens for a period of 5 weeks in a study of the effect of fat on the intestinal synthesis of biotin. An indication was obtained to the effect that 20% fat with dextrin favored the intestinal synthesis of biotin to a greater extent than 5% fat with dextrin.—*Auth.* (courtesy Wistar Bibl. Serv.).

CRAVENS, W. W. *(U. Wisconsin, Madison)* REVIEW—ANIMAL PROTEIN FACTORS. *Proceedings 5th Distillers Feed Conference,* January 24, 1950, Cincinnati, Ohio, page 11).—

1. Vitamin B_{12} is essential for growth and reproduction of poultry and swine. A deficiency of the vitamin results in reproductive failure, increased mortality of the young produced, and reduced growth of the young. The requirements of the chicken after 8 weeks of age and for the laying hen are much less than that of the very young chick and the breeding bird.

2. Vitamin B_{12} is an important vitamin in practical feeding, but it is simply another vitamin which must be considered in designing a good ration for growth and reproduction of poultry and swine.

3. The "animal protein factor" is a complex consisting of vitamin B_{12} and one or more unidentified factors required by poultry fed all vegetable type rations complete in the known nutritive factors. Vitamin B_{12} seems to be the most important member of the complex in practical poultry feeding where soybean oil meal serves as the chief protein feedstuff. (Experiment Station Record)

CRAVENS, W. W., and ESMOND E. SNELL. *(U. Wisconsin, Madison.)* EFFECTS OF DESOXYPYRIDOXINE AND VITAMIN B_6 ON DEVELOPMENT OF THE CHICK EMBRYO. *Proc. Soc. Exptl. Biol. and Med. 71:* 73-76. 1949.—Desoxypyridoxine (1000 μg.) injected into eggs prior to the start of the incubation period resulted in 100% mortality of the embryos; this inhibition was prevented by simultaneous injn. of any of the 3 forms of vit. B_6. The ratio of vit. to inhibitor which

permitted approx. 50% of the embryos to produce live chicks was 1:20 for pyridoxal, 1:50 for pyridoxamine and 1:100 for pyridoxine. When injected after 4 or more days of incubation, 1000 μg. of desoxypyridoxine proved non-toxic. Higher levels injected at 6 days of incubation proved toxic but this toxicity could not be prevented by any of the 3 forms of vit. B_6. A possible explanation for this observed variation in toxicity of desoxypyridoxine at different stages of incubation is offered. Pyridoxal HCl and pyridoxine HCl also proved toxic at high levels while pyridoxamine 2HCl was not toxic at the highest level tested. Neither nicotinic acid nor its amide affected the inhibitory action of desoxypyridoxine; negative results were also obtained when DL-alanine was injected alone or with nicotinic acid. These expts. demonstrate that vit. B_6 becomes essential for embryonic growth very early in the incubation period—*Authors* (Biological Abstracts)

DAM, HENRIK, INGER KRUSE, INGE PRANGE, and EBBE SONDERGAARD. *(Polytech. Inst., Copenhagen.)* INFLUENCE OF DIETARY ASCORBIC ACID, NORDIHYDROGUAIARETIC ACID AND CYSTINE ON VITAMIN E DEFICIENCY SYMPTOMS IN CHICKS. *Biochim. et Biophys. Acta 2:* 501-513. 1948.—Exudate diathesis in chicks produced by rearing them on diets rich in highly unsaturated fatty acids and low in vit. E can be counteracted to a considerable extent by the addition of 0.5% ascorbic acid (II), nordihydroguaiaretic acid (III) or cysteine to the diet. Encephalomalacia in chicks produced by diets low in I can be counteracted by the addition of 0.5% II, but not by a corresponding amt. of III. Encephalomalacia produced by diets containing 35% dried hog liver did not respond to treatment with 0.5% II. Detns. of tocopherol in fat of adipose tissue show that II and III protect this tissue against depletion of vit. E.—*T. E. King.* (Biological Abstracts)

EVELETH, D. F., A. I. GOLDSBY, and O. A. STEVENS. *(Agric. Expt. Sta., Fargo, N. Dakota.)* TESTS ON THE SEED OF LEAD PLANT AS A FEED FOR CHICKENS AND PHEASANTS. *Dakota Agric. Expt. Sta. Bimo. Bull. 11:* 129. 1949.—Although chicks of several ages as well as mature pheasants refused the intact seeds of the lead plant *(Amorpha fruticosa)*, they consumed them when ground and mixed in growing mash. As a result of eating the mixture, young chicks were often killed and more mature chicks as well as pheasants survived but showed a marked loss of wt. It is concluded that the lead plant, which is commonly used in shelter-belt planting, is of no use as winter feed for pheasants because its seeds would not be consumed.—*J. F. Reed.* (Biological Abstracts)

FALANGHE, O. *(Inst. Biol., Sao Paulo, Brazil.)* SUBSTITUICAO DOS FARELOS DE TRIGO POR FARELOS DE ARROZ E MANDIOCA NA ALIMENTACAO DE POEDEIRAS. [SUBSTITUTION OF RICE AND MANIOC MEALS FOR WHEAT MEAL IN THE FEEDING OF LAYING HENS.] *Biologico [Sao Paulo] 15:* 35-38. 1949.—Two groups of 20 R. I. Reds in their first laying year were both put for 30 days on ration with wheat meal, then one on rice and manioc substitute for 40 days, then the other on rice and manioc for 30 days. The groups being fed on the rice- and manioc-containing ration produced 434 and 288 eggs respectively, compared with 375 and 239 produced by those on wheat-containing feed. Costs, and other constituents, were the same for both formulae.—*J. L. Cartledge.* (Biological Abstracts)

FRITZ, J. C. *(Borden Company)* THE ANIMAL PROTEIN FACTOR. *Flour & Feed,* December, 1949, 50: 14-15).—Unextracted liver meal and fish solubles are perhaps the best of the natural sources. Fish meal and dried skim milk are good sources, but greater than usual levels of these ingredients must be used if they are to furnish the principal source of Animal Protein Factor for the ration. Meat scraps and tankage are quite variable and cannot usually be depended upon without assay of the particular lot or lots in question. Most investigators believe that fresh or dried greens—such as alfalfa—are fair sources of this factor. However, it should be noted that Zucker and Zucker failed to find any

activity in plant sources in their tests with rats. Yeast is almost completely devoid of Animal Protein Factor, and it is, in fact, used to furnish other members of the B complex in rations for assay of the Animal Protein Factor.

1. The Animal Protein Factor is not new--only the recent emphasis and the high potency concentrates are new.
2. It is a vitamin of the water-soluble B complex, and cannot serve as a protein or replace protein in the ration.
3. Vitamin B_{12} is an important part of the Animal Protein Factor but probably not the entire factor of value to poultry.
4. Vitamin B_{12} concentrates may be used to standardize or augment natural sources, but they should not be expected to produce results superior to those which can be obtained with natural ingredients which contain the Animal Protein Factor. (Experiment Station Record)

GOODMAN, J. G. GREEN FEED AS A SUPPLEMENT TO GRAIN FOR LAYING HENS. *Alabama Agricultural Experiment Station 58th and 59th Annual Reports*, page 39.—Hens grazing rape and sudan grass did not lay as many eggs as hens fed a full ration. Eggs laid by these hens were observed to be lower in market quality. Olive-green yolks were obtained in 43 percent of the eggs from hens grazed on these two crops. (Experiment Station Record)

GRANER, E. A. A INFLUENCIA DOS PIGMENTOS AMARELO-LARANJA VARIOS ALIMENTOS NA COLORACAO DA GEMA DE OVO DE GALINHA. [INFLUENCE OF ORANGE-YELLOW PIGMENTS ON EGG YOLK.] *An. Escola Agric. "Luiz de Queiroz" 4:* 372-378. 1947.—Dark orange maize plus green feed gives the most intense color to the yolk. Carrot and beet, without the leaves, did not give a satisfactory color to the yolk.—*W. G. Houk.* (Biological Abstracts)

GRANER, E. A., and A. P. TORRES. OS PIGMENTOS AMARELO-LARANJA DO GRAO DE MILHO COMO PRECURSORES DA VITAMINA A NA ALIMENTACAO DOS PINTOS. [YELLOW PIGMENTS IN CORN AND GROWING PULLETS.] *An. Escola Superior Agric. "Luiz de Queiroz" 4:* 290-306. Illus. 1947.—Corn vars. Cateto and Armour, both yellow, prevented avitaminosis A; white corn did not.—*W. G. Houk.* (Biological Abstracts)

HALE, R. W., and W. BOLTON. *(Queen's U., Belfast.)* SESAME CAKE MEAL AS A PROTEIN CONCENTRATE FOR LAYING PULLETS. *Jour. Agric. Sci. 38:* 437-439. 1948.—Eight pens of 25 birds each were used to compare sesame cake meal with peanut cake meal through a year's feeding. The sesame cake meal was found to be almost equal to the peanut cake meal; the difference was of doubtful significance.—*Henry Dorsey.* (Biological Abstracts)

HENRY, THOMAS R. *(Philadelphia, Pa.)* NEW GROUP OF FIVE VITAMINS REPORTED TO CHEMICAL SOCIETY. Discoverer believes folinic acids may have important place in treatment of anemias. *(Printed on first page of a D. C. newspaper.)* April 10.—Discovery of a new group of five vitamins was reported to the American Chemical Society which opened its spring meetings here today.

These vitamins, the folinic acids, may eventually have an important place in medical treatments of various anemias and of sprue, it is believed by Dr. William Shive of the University of Texas, their discoverer.

They are closely related to each other and to folic acid, whose discovery early in World War II first opened the door to successful treatment of both nutritional and pernicious anemia. The starting point of all five synthetic products is an hitherto unknown acid found in beef livers. The chemical is quite different from folic acid but apparently has an even greater efficiency potency for anemia treatment.

It will be found to have about the same distribution in nature as folic acid, which is found both in livers and in green leaves. (Experiment Station Record)

JARDIM, WALTER R., and A. P. TRIVELIN. A INFLUENCIA DA ALIMENTACAO VERDE NA POSTURA. [EFFECT OF GREEN FEED ON EGG PRODUCTION.] *An. Escola Superior Agric. "Luiz de Queiroz" 4:* 452-457. 1947.—Green feed does not appear to affect egg production.—*W. G. Houk.* (Biological Abstracts)

JENSEN, L. S. HENS GAIN ON ALFALFA. *Flour & Feed*, December, 1949, 50: 24.—

Five diets containing 2.5, 10.0, 15.0, 20.0 and 25.0 percent alfalfa, respectively, were fed in the mash form. All the diets, except the one with 2.5 percent alfalfa, were fed as pellets. White Leghorn hens, housed in individual laying cages at the W.S.C. poultry plant, were used in the experiment and were fed the various diets for a period of six months.

Contrary to the work at Rhode Island, no depression of egg production was observed as the level of alfalfa was increased in the diets. All groups of hens layed at the comparatively high rate of production of 70 percent during the course of the experiment. Neither the level of alfalfa nor the treatment of mash or pellet had any effect upon the rate of lay. There was also no effect on the size of the eggs.

In observing the egg yolk color, it was found that a definite increase in the yellow color of the yolks occurred as the percent of alfalfa was increased. After the completion of the hen experiment, a similar experiment was conducted with chicks.

A slight difference in the growth rate in favor of the pellet-fed groups showed up the first week, and this difference continued to widen through the experiment. The results at the end of the seven-week feeding period showed that all the pellet-fed groups significantly outgained the corresponding mash-fed groups. On both the pellets and mash diets, a definite downward trend in the growth rate occurred as the level of dehydrated alfalfa was increased. The depression of growth was less marked in the pellet-fed groups. (Experiment Station Record)

JOHNSON, E. L. APF FOR POULTRY. *Iowa Farm Science, Vol. 3, No. 12,* June, 1949: 3-4.—

In experiments at the Iowa Station the addition of APF (animal protein factor) concentrate to a ration with plant proteins produced chicks which were equal in growth and appearance to those produced by similar rations containing animal proteins.

Growth has been slow and livability poor when soybean meal has been the sole protein concentrate in rations for chicks. Growth and livability were improved by adding the same animal protein feeds which improved hatchability.

Actually, it has even been shown that adding dried cow or poultry manure to chick rations increased growth. Some investigators thought this increased growth was due to a male hormone in the cow manure.

Research was not, however, in agreement with this idea. A simple heat treatment destroyed the hormone but did not affect the hatchability factor.

Vitamin B_{12} is definitely related to the animal protein factor.

It is known to be at least a part of the animal protein factor, but preliminary research indicates the two are not identical.

One pound of crystalline vitamin B_{12} is enough for *900 million* chicks for one week. (Experiment Station Record)

JOHNSON, R. M., R. W. SWICK, and C. A. BAUMANN. *(U. Wisconsin, Madison.)* THE VITAMIN A ACTIVITY OF CERTAIN CAROTENOIDS IN THE CHICK. *Arch. Biochem. 22:* 122-131. 1949.—For the growth of depleted chicks and the prevention of symptoms of vit. A deficiency, vit. A proved to be somewhat more active than beta-carotene, alpha-carotene was about 50% as active as beta-carotene, while cryptoxanthine was intermediate in activity between alpha- and beta-carotene. For the accumulation of vit. A in the livers of chicks, cryptoxanthine was nearly equal to beta-carotene; neo-beta-carotene B was somewhat more than half as active as the all-trans-isomer, while alpha-carotene was less than half as active as beta-carotene, beta-Carotene was almost as active as vit. A itself. Thus, except for certain minor

quantitative differences, the relative activities of the carotenoids in the chick were quite similar to those in the rat.—*C. A. Baumann.* (Biological Abstracts)

JULL, M. A. *(U. Maryland, College Park.)* UNIVERSITY OF MARYLAND RESEARCH RESULTS. *Amer. Egg and Poultry Rev. 10:* 36-38. 1949.—A résumé of the following topics is given. Hormone effect on metabolic rate and feed efficiency; effects of kinds of matings and feed utilization; folic acid requirements of laying pullets; amino acid in nutrition; fiber source important; blood loss in killing; and shell treating eggs. Diets containing 0.2% thiouracil and thyroprotein at the rate of 1 g. in 100 lbs. of feed gave normal growth rates on 5% less feed during the first 5 weeks of growing period. Market quality of dressed birds was superior to those fed untreated feed. Differences were noted in the matings used. Results indicated that 26 to 34 μg. of folic acid per 100 g. of diet are required for normal hatchability of eggs, while 26 μg./100 g. was adequate for normal production and fertility of eggs. Addition of 4% of L-arginine, L-glutamic acid or L-leucine to the diet resulted in increased growth response of chicks regardless of the level of pyridoxine. Good results were obtained when chicks were fed a ration containing 2% fiber from oats, corn or ruffex. Approx. 10% of body wt. of young chicks is blood. Oil treatment of eggs at 90° to 120°F for 80 sec. or 160°F for 10 sec. or less gave satisfactory results. The thermostalization of eggs at 140°F for 15 min. provided the outstanding result of the expt.—*H. G. Lindquist.* (Biological Abstracts)

KEMPSTER, H. L. and Q. B. KINDER. THE USE OF VEGETABLE PROTEIN CONCENTRATES AND CRYSTALLINE RIBOFLAVIN IN PRACTICAL RATIONS FOR GROWING CHICKS. *Missouri's Sixtieth Year of Agricultural Research Annual report for 1947-48, Bulletin 528, 42;* 1949.—A ration of cereal grains using soybean oil meal as the sole source of supplementary protein and supplemented with crystalline riboflavin has proved satisfactory. (Experiment Station Record)

KEMPSTER, H. L. and Q. B. KINDER. THE USE OF LAYING CONCENTRATES FOR EGG PRODUCTION. Missouri's Sixtieth Year of Agricultural Research, *Annual report for 1947-48, Bulletin 528;* 43, 1949.—

Laying concentrates containing 32 per cent protein were hopper fed with free choice of various combinations of grain. A pen hand fed grain and a 20 per cent protein laying mash served as a check. One pen had free choice of corn, wheat and oats, a second pen corn and oats, and a third corn alone.

During a 7 months test, October to April inclusive, the following results were observed: corn, wheat and oats 122 eggs per hen, corn and oats 133, corn alone 120 and 108 for the check pen. Whole grain constitute 81, 79, 72 and 75 per cent of the ration, respectively. A second test for the same length of time resulted as follows: corn, oats and wheat 116 eggs per hen, corn and oats 105, corn alone 93. (Experiment Station Record)

KLOSE, A. A. HORMONE FATTENING. Poultry Section, Poultry Products Division. *Fact Finding Conference, Institute of American Poultry Industries, Kansas City, Missouri.* Feb. 11-14, 1950: 2-3.

Birds at 7 weeks of age are hormonized at the rate of 700 per hr. by use of an automatic self loading syringe. The total cost is 1¢/lb. live weight while it was stated that the 11 week old hormonized broilers command a premium of 5¢/lb. in the market. Preference for these birds is attributed to better fleshing, abundant fat, soft skin, and less pin feathers. (An interesting side light to this development is the report that the residual unadsorbed stilbesterol in the chicken necks was getting into the fox and mink food made from poultry waste and causing abortions.) Hormone treatment is being used on turkeys in some areas. It is claimed that treated turkeys can be marketed at 21-24 weeks in comparison with 28 weeks for untreated turkeys. There is also a reduction in the size of the pouch, which is a waste item on the carcass. The hor-

mone has no direct effect on the feed conversion ratio (lbs. feed per lb. meat), but if the birds can be well finished and free of pin feathers at an earlier age and weight, the over-all feed conversion ratio will be less. This factor can be the difference between profit and loss in many broiler operations. (Experiment Station Record)

LILLIE, ROBERT J., S. J. MARSDEN, A. C. GROSCHKE, and H. R. BIRD. *(U.S. Dept. Agric., Beltsville, Md.)* RELATIVE REQUIREMENT AND SOURCE OF VITAMIN B_{12} FOR TURKEYS AND CHICKENS DURING THE LATER STAGES OF GROWTH. *Poultry Sci. 28:* 541-548. 1949.—Beltsville Small White turkey poults reared on wire and slat floors to 20 weeks of age did not grow so rapidly if the 6% of fish meal in their diet was replaced by soybean meal at 8 weeks of age as if it was continued in the diet. Turkeys grew as well if the 6% of fish meal was replaced by meat meal at 8 weeks of age as if they continued to receive fish meal. Growth of turkey poults was retarded if meat meal was fed from hatching time on or if meat meal replaced fish meal at 4 weeks of age. The basal diet contained soybean meal as the sole protein supplement. Expts. with Rhode Island Red baby chicks indicated that meat meal was a less potent source of vitamin B_{12} than was fish meal. Meat meal was an effective supplement, however, when fed as 8% of the diet. R. I. Red pullets reared on range were fed a diet containing soybean meal as the principal source of protein with 4% of fish meal until they were 8 weeks old. The pullets then were divided into two equal lots, one of which received 2.5% of fish meal and the other, no fish meal. There were no important differences in growth rates, age at sexual maturity, or subsequent egg production, and hatchability. The requirement of the turkey poult and of the growing chicken for vitamin B_{12} appears to be less, per unit of feed, during the later than during the early stages of growth.—*R. J. Lillie.* (Biological Abstracts)

LINDSTROM, RUSSELL G., CHARLIE F. PETERSEN, A. C. WIESE, and P. R. MOORE. *(Idaho Agric. Expt. Sta., Moscow.)* EFFECT ON HATCHABILITY OF FISH MEAL FED TO HENS DEFICIENT IN THE UNIDENTIFIED HATCHABILITY FACTOR. *Poultry Sci. 28:* 552-555. 1949.—Ninety-six White Leghorn pullets, approx. 6 mo. of age, were equally divided into 2 groups and fed the same all-mash diet in which the supplementary protein was supplied by soybean oil meal. The basal diet contained no animal protein sources. One group of hens was reared in an open pen on wheat straw litter. The 2d group was reared in individual wire-bottom laying cages in order to prevent coprophagy. The purpose of the expt. was to determine the effect of management on hatchability and also to determine how much herring fish meal would be required to promote good hatchability when fed to hens deficient in the unidentified hatchability factor. Hatching data were obtained after feeding the soybean oil meal basal diet to the 2 groups of hens for 3 mos. At that time the percent hatch for the battery confined hens was 30% compared with approx. 80% for hens reared on wheat straw litter. The battery hens continued to decline in hatchability to about 10%, whereas the eggs of hens in the open-pen continued to hatch at about 70% over a period of 9 mos. Five levels of fish meal (0, 0.33, 0.66, 1.50, 3, and 4.5%) were added to the basal diet and fed to 6 lots of 8 hens each of those confined to wire-bottom batteries. The hens had previously been depleted in the hatchability factor. An immediate response in hatch occurred during the 1st week of feeding and a maximum level was attained within 2 or 3 weeks. Fish meal supplements of 0.66 to 1.5% supplied an adequate amt. of the hatchability factor to increase the % hatch from 10 to 75. When the fish meal supplements were removed, the decline in hatchability was considerably slower than the increase had been. The hens fed the 2 lowest levels (0.33 and 0.66%) declined to a low level of hatch within 6 weeks. The hens which had received the 3 higher levels declined much slower, showing a body storage of the factor when fed these levels for a period of 6 weeks.—*Authors.* (Biological Abstracts)

MacGREGOR, H. I., JAMES McGINNIS, and J. S. CARVER. *(State Coll. Wash., Pullman.)* THE EFFECT OF DIFFERENT IN-

TAKES OF RIBOFLAVIN ON GROWTH OF BROAD BREASTED BRONZE TURKEYS AFTER EIGHT WEEKS OF AGE. *Poultry Sci. 27:* 675. 1948.—*An abstract.* (Biological Abstracts)

MAHON, J. H., and R. H. COMMON. THE AMINO ACID COMPOSITION OF THE HORSEBEAN (VICIA FABA L.) AS RELATED TO ITS NUTRITIVE VALUE FOR CHICKS. *Scientific Agriculture, 30:* 43. 1950.—A simple procedure is described whereby 88 percent of the true protein of horsebean meal can be extracted with dilute alkali and reprecipitated relatively free from carbohydrate.

The results are discussed in relation to existing data on the amino deficiencies of the horsebean when used as a source of protein in chick rations. Horsebean protein is relatively very deficient in methionine and cystine, and deficient to a lesser degree in tryptophane, glycine, phenylalanine and threonine. The analytical results confirm the finding of others that the nutritional deficiencies of horsebean meal as a source of protein in chick rations can be largely met by supplementing with methionine. Horsebean protein is likely to be adequate in arginine, histidine, isoleucine, leucine, lysine and valine if used as a sole source of protein for chicks. (Experiment Station Record)

MATTERSON, L. D. DISTILLERS SOLUBLES FOR RAPIDLY GROWING BROILERS. *Proceedings 5th Distillers Feed Conference, Cincinnati, Ohio, January 24, 1950: 26.*—It has been shown that in certain rations Corn Distillers Dried Solubles are superior to Butyl Solubles while in other combinations the reverse is true.

When compared on a unit for unit basis at a 2% level, Corn Distillers Dried Solubles are deficient in pantothenic acid when compared with Butyl Solubles.

Corn Distillers Dried Solubles have proved a very effective vitamin supplement in combination with certain A.P.F. Concentrates. (Experiment Station Record)

MUKHERJEE, R., and D. PARTHASARTHY. *(Indian Vet. Res. Inst., Izatnagar.)* THE DIGESTIBLE NUTRIENTS OF CERTAIN CEREAL GRAINS AS DETERMINED BY EXPERIMENTS ON INDIAN FOWLS. *Indian Jour. Vet. Sci. and Animal Husbandry 18:* 41-45. 1948.—The suitability of cheena, ragi *(Eleusine coracana)*, barley, bajra *(Pennisetum typhoideum)*, and jowar *(Sorghum vulgare)* for feeding to poultry was investigated. Bajra and jowar were richest in starch equivalent, while barley was the poorest amongst the grains studied. The grains, when arranged in decreasing order of digestible proteins, were barley, cheena, bajra or ragi or jowar.—*N. N. Dastur.* (Biological Abstracts)

MUKHERJEE, R., and D. PARTHASARATHY. *(Indian Vet. Res. Inst., Izatnagar.)* STUDIES ON THE BIOLOGICAL VALUES OF THE PROTEINS OF CERTAIN POULTRY FEEDS. *Indian Jour. Vet. Sci. and Animal Husbandry 18:* 51-56. 1948.—The biological value and digestibility coeffs. of the proteins of jowar *(Sorghum vulgare)*, cheena, bajra *(Pennisetum typhoideum)*, ragi *(Eleusine coracana)*, and barley, as detd. by the balance method, were 65.3, 52.6; 55.6, 50.4; 85.5, 74; 81, 63.2; and 81.9, 65.6%, respectively.—*N. N. Dastur.* (Biological Abstracts)

PARTHASARATHY, D., and R. MUKHERJEE. *(Indian Vet. Res. Inst., Izatnagar.)* THE MANGANESE CONTENT OF SOME POULTRY FEEDS. *Indian Jour. Vet. Sci. and Animal Husbandry 18:* 47-49. 1948.—The Mn content of 35 substances used as poultry feeds was estimated. Rice bran (156 ppm. of food stuff) and wheat bran (101.1 ppm.) were good sources of Mn.—*N. N. Dastur.* (Biological Abstracts)

REISER, RAYMOND, and PAUL BROWN PEARSON. *(Texas Agri. Expt. Sta., College Station.)* THE INFLUENCE OF HIGH LEVELS OF FAT WITH SUBOPTIMUM LEVELS OF RIBOFLAVIN ON THE GROWTH OF CHICKS. *Jour. Nutrition 38:* 247-256. 1949.—

Chicks receiving moderately high levels of refined cottonseed oil (Wesson oil) in diets low in riboflavin ceased to grow much sooner than those on a similar diet without added fat. The higher the cottonseed oil content of the diet, the greater the inhibitory effect on the rate of gain. The addition of riboflavin to the diets at a level of 4 μg./g. of feed prevented or corrected the phenomenon. Lard did not retard the growth rate on low riboflavin diets, and a commercial hydrogenated vegetable oil to only a slight degree. The effect is not due to the development of rancidity in the high fat diets. The efficiency of utilization of the feed was lower on the cottonseed oil diets than on the low fat diets at low levels of riboflavin, but no differences were found in the riboflavin content of the livers.—Auth. *(courtesy Wistar Bibl. Serv.).*

RUF, E. W., and JAMES A. MARVEL. *(Joseph E. Seagram and Sons, Inc.)* TURKEY FEEDS CONTAINING DISTILLERS GRAIN SOLUBLES. *Proceedings 5th Distillers Feed Conference, Cincinnati, Ohio, January 24, 1950, page 41.*—Distillers Grain Solubles have been used successfully in high efficiency type turkey rations. Although good results may be obtained if the rations contain sufficient amounts of only meat and bone scraps as a source of the "animal protein" factor, the data indicate that better results can be obtained if additional sources of this unidentified factor are included in the ration.

Feed efficiency was greater with the high energy ration containing Distillers Corn Solubles than with the control ration which contained high levels of wheat bran and wheat middlings. (Experiment Station Record)

RUSSELL, WALTER C., M. WIGHT TAYLOR, and ROBERT Van REEN. *(Agric. Expt. Sta., New Brunswick, N. J.)* VITAMIN A REQUIREMENT OF THE TURKEY POULT FED A PURIFIED DIET. *Fed. Proc. 8:* 394. 1949.—*An abstract.* (Biological Abstracts)

SLINGER, S. J., K. M. GARTLEY, and E. V. EVANS. *(Ontario Agric. Coll., Guelph, Canada.)* PELLETED AND UNPELLETED DIETS HIGH IN DEHYDRATED GREEN FEEDS FOR TURKEYS GROWN IN CONFINEMENT. *Poultry Sci. 28:* 556-561. 1949.—Groups of Broad Breasted Bronze turkeys were fed mashes containing 10, 15 and 20% of dehydrated green feed. The same diets but in pellet form were fed to duplicate groups. The results of the expt. indicate that while slightly better growth was obtained at the lower levels of green feed, even the 20% level gave satisfactory growth. Much greater differences were found between the pelleted and unpelleted mashes, however, than between the levels of dehydrated green feed. The 24th week wts. of all groups receiving pellets were greater than those of any groups receiving mash, significantly so in most cases. More advantage appeared to be gained by pelleting mashes containing 15 and 20% green feed than one containing 10%. Feed efficiency was slightly higher for pellet-fed than for mash-fed groups.—*S. J. Slinger.* (Biological Abstracts)

SLINGER, S. J., D. C. HILL, K. M. GARTLEY, and H. D. BRANION. *(Ontario Agric. Coll., Guelph, Canada.)* SOYBEAN OIL MEAL AND SUNFLOWER SEED OIL MEAL IN RATIONS FOR BROAD-BREASTED BRONZE TURKEYS. *Poultry Sci. 28:* 534-540. 1949.—At least 6% of an equal parts mixture of fish meal, meat meal and buttermilk powder was required to supplement adequately a high soybean-oil-meal diet for Broad-Breasted Bronze turkeys raised on wire to 24 weeks of age. 5% of dried cow manure was also effective and, in addition appeared to supply a factor which promoted early and rapid feathering. Addition of 0.2% DL-methionine to a diet containing soybean oil meal as the sole protein supplement increased the growth to 5 weeks of age, the duration of the expt. Inclusion of 3% fish meal in this diet produced a further growth response. The sunflower seed oil meal used was seriously deficient in lysine for the poult. Nor was an equal parts mixture of soybean oil meal and sunflower seed oil meal satisfactory as a sole protein supplement for early rapid growth.—*D. C. Hill.* (Biological Abstracts)

THAYER, R. H., and V. G. HELLER. *(Agric. Expt. Sta., Stillwater, Okla.)* MUNG BEANS AS A POULTRY FEED. *Bull. Oklahoma Agric. Expt. Sta.* 336. 1-8. 1949.—Mung beans *(Paseolus aureus)* of the so-called green type were ground and used to replace soybean meal and cottonseed meal in starter, grower, layer and breeder mashes for chickens. Levels up to 40% of the mash were fed. Satisfactory growth, egg production and hatchability were obtained when the mung beans were properly supplemented with steamed bone meal, meat and bone scrap and dried buttermilk. Whole mung beans were also used to replace part of the corn or wheat in scratch grain for hens. Mung beans had no detrimental effect on egg quality.—*R. H. Thayer.* (Biological Abstracts)

THAYER, ROLLIN H., and R. B. THOMPSON. *(Agric. Expt. Sta., Stillwater, Okla.)* FEEDING CHICKENS: CHICKS, BROILERS, LAYING HENS AND BREEDERS. *Circ. Oklahoma Agric. Expt. Sta. 133.* 1-23. 1949.—Summary of feeding methods for Oklahoma flock owners; plus recommended feed mixtures and growth rates to be expected under Oklahoma conditions, as shown in Oklahoma Station feeding trials.—*Authors.* (Biological Abstracts)

TORRES, A. di PARAVICINI. ALIMENTACAO DOS MARRECOS [DUCK FEED.] *An. Escola Superior Agric. "Luiz de Queiroz" 4:* 268-275. 1947.—Utilization of green feed, winter, summer and whole-year types: giant rape and mangels, teosinte, and chicory, respectively.—*W. G. Houk.* (Biological Abstracts)

WEEK, ERLING F., and FRANK J. SEVIGNE. VITAMIN A UTILIZATION STUDIES.—I. THE UTILIZATION OF VITAMIN A ALCOHOL, VITAMIN A ACETATE AND VITAMIN A NATURAL ESTERS BY THE CHICK. *Journal of Nutrition, 39:* 233. 1949.—Wide variations in the storage of vitamin A in the livers of chicks were found, depending both on the form of vitamin A fed and on the character and quantity of diluent. . . . The following carriers were shown to contain factors inhibiting vitamin A ester hydrolysis: jojoba seed oil, ethyl laurate, basking shark liver oil and mineral oil. Sardine oil was shown to contain factors which interfere with the hydrolysis of vitamin A natural esters, although not with the hydrolysis of vitamin A acetate. Although statistical significance was not demonstrated, it appears likely that cottonseed oil and corn oil also contain small amounts of factors which interfere with vitamin A ester hydrolysis.

The existence of factors affecting vitamin A absorption per se was also demonstrated. (Experiment Station Record)

BROILER PRODUCTION. *Poultry Husbandry Department. (Agric. Expt. Sta., Stillwater, Okla.) Circ. Oklahoma Agric. Expt. Sta. 134.* 1-30. Illus. 1949.—Summary of methods and recommended rations for farm broiler production under Oklahoma conditions. Includes 3 high-energy, low-fiber broiler rations developed and tested by the Oklahoma Station, using feeds usually available and economical in that state.—*Authors.* (Biological Abstracts)

CHICK EMBRYO MAKES VITAMIN FROM PROTEIN, *Report of the Chief of the Bureau of Animal Industry Agricultural Research Administration 1949, page 28.*—Recent work at Beltsville showed that during the 21 days of incubation the nicotinic acid content of an egg increased from 36 micrograms to 1,080 micrograms while tryptophan decreased from 116 milligrams to 72 milligrams. Furthermore, injection of 25 milligrams of additional tryptophan into eggs on the tenth day of incubation significantly increased the nicotinic acid content of the newly hatched chicks. (Experiment Station Record)

COTTONSEED MEAL IN DIETS FOR BREEDING HENS, *Report of the Chief of the Bureau of Animal Industry Agricultural Research Administration 1949, page 28.*—Experiments in which several cottonseed meals of known gossypol content were fed to laying pullets in combination with yellow corn, alfalfa meal, and mineral and vitamin sup-

plements showed that as the free gossypol content of the diets increased, the degree of yolk darkening in stored eggs increased and hatchability of eggs decreased. (Experiment Station Record)

UNIDENTIFIED VITAMIN FOR POULTRY IDENTIFIED AS VITAMIN B_{12}. *Report of the Chief of the Bureau of Animal Industry Agricultural Research Administration 1949, page 28.*—Injecting 0.5 to 1.25 micrograms of the crystalline vitamin into the eggs of hens fed a vitamin B_{12} deficient diet resulted in improved hatchability of eggs and improved growth, viability, and feathering of chicks. Supplying B_{12} to the chicks of deficient hens after hatching did not improve viability and feathering. These results emphasized the importance of an adequate supply of this vitamin in the diet of breeders. It has been shown that the quantity of vitamin B_{12} normally occurring in eggs is dependent on the quantity in the hen's diet. (Experiment Station Record)

PATHOLOGY

COLES, J. D. W. A. COCCIDIOSIS. *Farming in S. Africa 23:* 398-399, 402. 1948.—The symptoms and post-mortem appearances of infected birds are discussed as well as the origin of the disease on poultry farms. A number of important management steps are presented that are essential in controlling the disease. Good sanitation is essential in the control of coccidiosis.—*A. L. Pope.* (Biological Abstracts)

COLES, J. D. W. A. HYGIENE ON THE POULTRY FARM. *Farming in S. Africa 23:* 407-412. 1948.—The author emphasizes the importance of sound sanitary practices in poultry husbandry and discourages the use of drugs to keep a flock healthy. Proper housing, equipment, breeding, and feeding are discussed. The intensive system is recommended which includes keeping birds on impervious floors after the age of 5 mos.—*A. L. Pope.* (Biological Abstracts)

EDGAR, E. A. SURVEY OF PARASITES OF ALABAMA CHICKENS. *Alabama Agricultural Experiment Station 58th and 59th Annual Reports, page 41.*—Parasites found in 221 chickens, a few turkeys and one peafowl, included nematodes, cestodes, protozoa, and ectoparasites, or a total of 49 species in all; 40 of these were from the chicken alone. (Experiment Station Record)

EDGAR, S. A., and O. M. WILLIAMS. EFFECT OF MOSQUITOES ON POULTRY. *Alabama Agricultural Experiment Station 58th and 59th Annual Reports,* page 38-39.—The common pest mosquito, *Culex quinquefasciatus,* has a high preference for the blood of the domestic fowl, *Gallus domesticus.* This species comprised over 99 percent of the mosquitoes seen or collected in or near chicken houses. (Experiment Station Record)

MAYFIELD, ORLEY, J., NEAL F. MOREHOUSE, and ARTHUR W. WALDE, *assignors to Dr. Salsbury's Labs.* COMPOSITION FOR CONTROL OF POULTRY COCCIDIOSIS. *U.S. Patent 2,449,080 and 2,449,081,* Appln. Dec. 6, 1940 and July 3, 1942, Issd. Sept. 14, 1948.—p-Hydroxyphenylarsonic acid or its Na salt, when admd. to chickens in 0.025-0.2% solns., gave satisfactory control of *Eimeria tenella* and *E. necrulina.* Compositions of phenylarsonic acid, p-hydroxyarsonic acid or water-soluble salts thereof with 0.2-0.025% concns. are claimed. (Biological Abstracts)

MOREHOUSE, NEAL F., and ORLEY J. MAYFIELD, *assignors to Dr. Salsbury's Laboratories.* POULTRY TREATMENT COMPOSI-

TION. *U.S. Patent 2,450,866*, Appln. Oct. 4, 1946, Issd. Oct. 5, 1948.—A prepn. for the oral treatment of coccidiosis contains 0.005-0.035% 3-nitro-4-hydroxyphenylarsonic acid or its salts. The acid or its salts may also be incorporated into the feed. (Biological Abstracts)

PETERSON, O. H. SOMETHING NEW ON NEWCASTLE . . . NOSE-DROP VACCINE! *NEW INTRANASAL VACCINE GIVES IMMUNITY WITH ONE DROP. SAFE FOR CHICKS OR LAYING HENS. Hatchery & Feed, 24:* 14. March, 1950.—The new intranasal or nose-drop vaccine is a live-virus Newcastle-disease vaccine prepared from an extremely mild strain of Newcastle-disease virus. The vaccine may be used with safety on day-old chicks and has been used rather extensively on laying hens in full production without serious loss of egg production.

The new intranasal Newcastle-disease vaccine provides the high degree of immunity that is obtained by the use of live-virus vaccines, and at the same time is mild enough that it can be used with safety on day-old chicks. Chicks vaccinated at one day of age with the intranasal live-virus vaccine have been shown to possess a high degree of immunity for at least a year after vaccination. Until very recently, only killed Newcastle-disease vaccine could be used on day-old chicks.

While the intranasal vaccine is the most promising method for the control of Newcastle disease which has yet been proposed, certain limitations are encountered in its use. Much of the effectiveness of the vaccine is lost if the birds are exposed to Newcastle disease before using the vaccine. If laying hens in production are vaccinated after exposure, the vaccination with the intranasal strain does not prevent the loss of egg production which always accompanies a Newcastle-disease outbreak. The intranasal Newcastle-disease vaccine has no curative properties and does not aid birds which are already infected. (Experiment Station Record)

SCHALLER, H. L. WE'RE WINNING THE WAR AGAINST PULLORUM. *Poultry Tribune 55:* 13, 50-51. 1949.—During 1948 approx. 30 million birds in 47 states were tested for pullorum disease with 1.19% reactors. This compares with 3.33% reactors in approx. 6 million birds tested in 1936.—*F. P. Jeffrey.* (Biological Abstracts)

TODD, A. C., T. G. CULTON, G. W. KELLEY, and M. F. HANSEN. *(Kentucky Agric. Expt. Sta., Lexington.)* INDUCED HYPERTHYROIDISM AND GROWTH OF PARASITIZED CHICKS. *Poultry Sci. 28:* 549-551. 1949.—A study of the resistance of broilers with induced hyperthyroidism to cecal coccidiosis. Slightly greater amts. of growth made by exptl. birds when compared with infected controls were found to be without statistical significance. Development of the agent of cecal coccidiosis, *Eimeria tenella*, was found to be significantly greater in the birds with induced hyperthyroidism.—*Authors.* (Biological Abstracts)

AN ANTIBIOTIC TESTED AGAINST CECAL COCCIDIOSIS. *Report of the Chief of the Bureau of Animal Industry Agricultural Research Administration, 1949*, page 63.—On the basis of the available evidence, bacitracin does not appear to hold any promise for the prevention of cecal coccidiosis. (Experiment Station Record)

ANTIPARASITIC MEDICATED MASH SAFE FOR USE, *Report of the Chief of the Bureau of Animal Industry Agricultural Research Administration, 1949*, page 64.—Previous studies showed that medicated feed containing approximately 66 parts of nicotine-bentonite (5 percent nicotine content), 33 parts of phenothiazine, and 44 parts of mash, by weight, removed a large percentage of cecal worms and intestinal roundworms from poultry. Persistent treatment for the removal of cecal worms is the best known method for checking the spread of blackhead, a disease that exacts a high toll from turkey growers. (Experiment Station Record)

BENZENE HEXACHLORIDE SAFE FOR CONTROLLING POULTRY PARASITES. *Report of the Chief of the Bureau of Animal Industry Agricultural Research Administration* 1949, pages 64-65.—

The fumigant action of liquid preparations of benzene hexachloride applied to hen-house roosts has been highly effective in the destruction of the body louse and the fluff louse on poultry.

Eggs laid on the first, second, and third days after application of the fumigant were sampled by four persons. No off odor or taste could be detected. One week after application, eggs laid during the entire week were sampled by 70 persons. No unpleasant odor or taste was reported. Five days after application, 18 of the old hens were killed and stewed with dumplings and eaten by 70 persons. None of the people who dressed the birds, cooked them, or ate them, detected any unpleasant odor or taste. (Experiment Station Record)

BORAX HAS LIMITED VALUE FOR THE CONTROL OF CECAL COCCIDIOSIS. *Report of the Chief of the Bureau of Animal Industry Agricultural Research Administration* 1949, page 63.—The addition of 2 percent borax to the mash, or enough of this chemical to make a 0.3 percent solution in the drinking water, protected the birds from cecal coccidiosis, provided the medication was given not later than 72 hours after exposure to infection. (Experiment Station Record)

COCCIDIA SURVIVE ON SOIL FOR LONG PERIODS. *Report of the Chief of the Bureau of Animal Industry Agricultural Research Administration* 1949, pages 62-62.—

Shade prolonged the survival of the oocysts of two out of three species of coccidia tested. The oocysts that produce cecal coccidiosis, *Eimeria tenella*, survived 48 weeks in deep shade and 41 weeks in areas that were unshaded or partly shaded. (Experiment Station Record)

FOWL TYPHOID. *Report of the Chief of the Bureau of Animal Industry Agricultural Research Administration* 1949, pages 44-45.—

Rats which have access to birds dead of fowl typhoid may carry the typhoid organisms to nearby poultry flocks, especially if they come in contact with the birds. Rat feces apparently are a poor source of *S. gallinarum*. (Experiment Station Record)

NEWCASTLE DISEASE. *Report of the Chief of the Bureau of Animal Industry Agricultural Research Administration* 1949, pages 46-48.—

For vaccinating birds against Newcastle disease, one of two products may be used: Live-virus vaccine or formalin-inactivated vaccine. There are several drawbacks to the live-virus vaccine. One is that all susceptible birds of a premises must be vaccinated simultaneously; otherwise the vaccinated birds may spread the disease to the unvaccinated susceptible birds. Should the virus be introduced into a laying flock, it will cause a complete interruption of egg production for several weeks, just as would take place if the birds had the naturally occurring disease. On the other hand, live-virus vaccine gives permanent immunity against the disease, whereas the immunity conferred by the killed virus is of comparatively short duration. Furthermore, the live-virus vaccine costs less and can be administered much more rapidly.

Results obtained during the year with a flock of 81,000 birds vaccinated with commercially prepared live-virus and killed-virus vaccines show that the former, when used properly, does not cause appreciable mortality or undesirable after effects in 4- to 5-week-old chickens. (Experiment Station Record)

PULLORUM DISEASE. *Report of the Chief of the Bureau of Animal Industry Agricultural Research Administration* 1949, pages 45-46.—

Of 551 chicks hatched from the original flock, 187 died, and *S. pullorum* was isolated from 80.2 percent of them. The following year 317 chicks hatched, and from 157 which died *S. pullorum* was recovered from 87.9 percent. Of 776 infertile eggs and dead embryos cultured in 1948, *S. pullorum* was recovered from 15.1 percent. In 1949, however, only 214 infertile eggs and dead embryos were cultured but 59.3 were infected with

S. pullorum. In 1948, 60 percent of the above-mentioned pullorum cultures were typed and all but seven were classed as variants. In 1949, 90 percent of the cultures were typed and all were classed as variants.

Experience during the hatching season this spring indicates that these strains of variant pullorum spread by contact much more readily than do standard strains. Very few birds infected with the standard strains die of pullorum disease, except baby chicks. (Experiment Station Record)

POULTRY PRODUCTS AND MARKETING

ALEXANDER, LUCY M., and GRACE SCHOPMEYER. YIELD OF EDIBLE PORTION OF CHICKEN AND VARIOUS MEATS COOKED BY DIFFERENT HOME METHODS. *Food Technol. 3:* 263-268. 1949.—For stewing hens (21), roasters (3), beef chuck ribs (4 pairs pot roasts), pork loin (12 chops), and liver (2 lots each beef, calf, and pork) cooking time, shrinkage, and yield were detd. Yield of cooked muscle plus skin with adhering fat was increased by cooling simmered hens in the broth. Roasters yielded more cooked muscle than stewers in proportion to wt. ready to cook, bone in. On this wt. base, yields of cooked muscle of boiled and simmered hens (cooled separately from the broth), braised beef chuck ribs, and fried and braised pork chops ranged from 33 to 39%. As percent wt. of raw muscle, estimated by sampling methods descr., yields of cooked muscle ranged from 64 to 72. Avg. yield of fried and braised liver was 69%. When these foods were boiled, simmered, or braised, their yields were directly related to the retention of moisture.—*L. M. Alexander.* (Biological Abstracts)

DANKERS, W. H. (*University Farm, St. Paul, Minn.*) LACK OF UNIFORMITY IN EGG GRADES AT THE PRODUCER LEVEL. *Poultry Sci. 27:* 657. 1948.—*An abstract.* (Biological Abstracts)

EARLE WENDELL. EGG QUALITY VARIES WITH HANDLING. *(N. Y. State Agr. Exp. Sta.) Farm Research,* April, 1950. Vol. XVI, No. 2; 4.—

Over a short period of time (1) differences in temperature below 60° had but little effect on egg quality, and (2) humidity did not apparently affect egg quality at low temperatures.

Humidity exerted the greatest influence on egg quality when the temperatures in the egg-holding rooms were relatively high. In August, when the temperature averaged 68°, the lots with high humidity had 62 per cent AA quality eggs, while the lots with low humidity had 50 per cent AA eggs. (Experiment Station Record)

FUNK, E. M., and HAROLD BIELLIER. THERMO-STABILIZATION OF SHELL EGGS. Missouri's Sixtieth Year of Agricultural Research, *Annual report for 1947-48, Bulletin 528:* 42, 1949.—Shell eggs stabilized commercially by Swift & Company at Beatrice, Nebraska have been observed over a period of 6 weeks at room temperature. The interior quality of these eggs held up remarkably well as compared to natural eggs but some mold contamination showed at the end of 6 weeks and the albumen of these stabilized eggs required considerably more time to whip. (Experiment Station Record)

GRANT, G. A., and W. H. WHITE. *Food Invest., Ottawa, Ont.* KEEPING QUALITY ENHANCED BY CURING AND SMOKING POULTRY. *Food in Canada 9:* 14-17. 1949.—In a preliminary study of the curing and smoking of poultry both chicken and fowl were cured in various pickles and smoked. After storage at 60°F. for 15 and 30 days chemical analyses and flavor tests were made and storage

stability assessed. The flavor of fresh chicken and fowl was preferable to that of the cured and smoked products. However the latter were acceptable and pleasing. The most desirable product contained 3-4% salt in the cured meat. The cured and smoked product kept better than the fresh, remaining acceptable after 15 days but moldy after 30 days' storage at 60°F.—*R. H. Haskins.* (Biological Abstracts)

HANNING, FLORA, and MARY LOUIS MITTS. (*U. Wisconsin, Madison.*) EFFECT OF COOKING ON THE FOLIC ACID CONTENT OF EGGS. *Jour. Amer. Dietetic Assoc. 25:* 226-228. 1949.—Measured by microbiological assay the folic acid content of egg ranged from 13-27 μg. per 100 g. raw; cooking scrambled, poached and fried showed losses of from 20-50%. A cooked egg may thus be expected to contribute 5-7 μg. of folic acid to a diet.—*M. C. Moore.* (Biological Abstracts)

HARDY, JOHN I., and THORA M. PLITT HARDY. FEATHERS FROM DOMESTIC AND WILD FOWL. *U. S. Dept. Agric. Circ. 803.* 1-28. 1949.—Realization that large quantities of feathers, by-product of the poultry industry and of hunter's bags, are wasted, led to the investigation. The study included types of feathers, their location on different parts of the body, their inherent qualities, their availability and preservation. Feathers of land birds were inferior as filling material to those of waterfowl. Chicken feathers had low bulking value, broiler feathers were inferior to those of adult chickens. Goose feathers were superior to duck feathers, the latter being superior to chicken feathers. Various apparatus were developed for the tests made. These are illustrated.—*W. A. Craft.* (Biological Abstracts)

JOHNSON, HUGH A., and JOE W. SICER. (*Purdue U., Lafayette, Ind.*) EGG QUALITY AND THE FARM PRODUCER. *Poultry Sci. 27:* 670. 1948.—*An abstract.* (Biological Abstracts)

KAHLENBERG, O. J. PROPER THAWING OF FROZEN EGGS IMPORTANT. *Northwestern Miller 238:* 38-42. 1949; *also in Baker's Digest 23:* 63-64. 1949.—The following are recommendations of the National Egg Products Association for the proper defrosting of frozen eggs:—Defrost covered frozen egg cans in cold, running water (50°-60°), with constant agitation. Defrosting can be accomplished in 9 hrs. by this procedure. An alternate method is to defrost at room temp. by circulating air by means of an electric fan directed toward the cans which should be placed on skids. The 3d method is to store eggs in a cooler at 40°-50°F for 24-36 hrs.—*Marjorie Howe.* (Biological Abstracts)

KING, D. F., and R. F. SCOFIELD. (Cooperating with Department of Agricultural Economics). EGG MARKETING WITH SPECIAL EMPHASIS ON THE HANDLING OF SEASONAL SURPLUSES. *(Alabama Agricultural Experiment Station 58th and 59th Annual Reports,* page 40-41.).—Eggs frozen at 10 degrees below zero had a lower bacterial count than eggs frozen at 0 or 10 degrees above zero. Dirty eggs resulted in a frozen product of much higher bacterial count than clean eggs, especially when the eggs were frozen at 10 degrees above zero. It was also found that eggs frozen in small containers had lower bacterial counts than those frozen in larger containers. (Experiment Station Record)

KLOSE, A. A. PROCESSING POULTRY. *Fact Finding Conference, Institute of American Poultry Industries, Kansas City, Missouri.* Feb. 11-14, 1950 p. 3.—The trend in killing poultry is away from cutting inside of the mouth and braining, and toward the outside or Kosher cut in the neck . . . It was reported that slush ice cooling resulted in 5-7% pick up in weight, compared to a 1% loss in air cooling, and also produced a better "bloom." There is now almost complete acceptance of warm evisceration as the preferred practice. . . . Eviscerated yields for warm evisceration are reported to be as high as for evisceration when cold. The kidneys in warm eviscerated birds are acceptable and may be left in the body cavity. Poultry is now being warm eviscerated, cut up,

packaged in cellophane window, moisture vapor proof, boxes; the boxes are packed in ice, shipped and sold within a period of 3 to 9 days. The cut surfaces are said to be as fresh appearing as when cutting is done in the retail store. (Experiment Station Record)

KLOSE, A. A., H. L. HANSON, and HANS LINEWEAVER. THE FREEZING PRESERVATION OF TURKEY MEAT STEAKS. *Food Technology, IV:* 71. 1950.—Crosscut turkey steaks packaged in cellophane and held at 10°F. or 0°F. showed flavor deterioration in 3 months when compared with controls held at —30°F. Steaks held at —10°F. did not show significant differences from the controls until 6 months of storage. Dark meat deteriorated more rapidly than light meat; hence dark meat steaks should be prepared and packaged separately. The addition of turkey fat to the deboned meat accelerated the development of off flavors. A greater deteriorative effect was obtained with whole tissue fat than with rendered fat. Evaluation of steaks to which freshly rendered turkey fat had been added just before cooking showed no beneficial effect of the fat on flavor or juiciness. Essentially equal protection was obtained from cellophane, polyethylene, or aluminum foil, while the best retention of quality was obtained by storing the meat in the form of the packaged half bird, and cutting into steaks just before evaluation. Considerable amounts of thawing and refreezing had little effect on quality of stored steaks. In most cases, significant decreases in flavor were correlated with significant increases in peroxide content of the fat. (Experiment Station Record)

MILLARES, R., and C. R. FELLERS. *(U. Massachusetts, Amherst.)* VITAMIN AND AMINO ACID CONTENT OF PROCESSED CHICKEN MEAT PRODUCTS. *Food Res. 14:* 131-143. 1949.—Thiamine showed the greatest susceptibility to destruction by thermal processing. The losses were closely related to the time and temp. of treatment to which the meats were subjected. Riboflavin was stable to heat and curing while niacin losses occurred only when the meat was cured and smoked. Tin and glass containers were equally effective in conserving vitamins and amino acids in chicken flesh. Little destruction of amino acids was noted to occur during commercial processing of chicken products, with only tryptophan showing significant losses. As much as 50% of this amino acid may be lost in the canning of chicken meat. Negligible losses of the other indispensible amino acids indicate that canning and/or curing and smoking can not be considered destructive to the proteins. Leucine, isoleucine, histidine and arginine are lost from chicken liver in appreciable amts. when cooked in water. 35 references. —*C. R. Fellers.* (Biological Abstracts)

PETERSON, GUY A., KEEPING EGGS FRESH ALL THE WAY. *News for Farmer Cooperatives, 16:* 8, March 1950.—A Co-op on the west coast has come up with something new in retaining the high quality of eggs all the way to the consumer. It's a self-service, refrigerated box for Grade AA eggs only. Already spotted in a number of strategically located retail stores these boxes remain the property of the San Diego Cooperative Poultry Association, San Diego, California. They keep the eggs cool, comfortable, and convenient for the buyer. (Experiment Station Record)

STEWART, GEORGE F. *(Iowa State Coll., Ames.)* HEAT TREATING LIQUID EGG—PRACTICAL QUALITY CONTROL. *U. S. Egg and Poultry Mag. 55:* 10-13, 30. 1949.—This work supplements that of Winter, previously given, in that Stewart works mainly on pasteurization of whole eggs. He reports that pasteurization of liquid whole eggs at 142°F. for 3 mins. kills more than 90% of all bacteria present in the egg product and generally will eliminate all coliform and similar organisms. Pasteurization will have little or no adverse effect on the culinary properties of egg products treated according to these recommendations. —*G. W. Newell.* (Biological Abstracts)

YUSHOK, W. D., and ALEXIS L. ROMANOFF. *(Cornell U., Ithaca.)* STUDIES ON PRESERVATION OF SHELL EGGS BY COAT-

ING WITH PLASTICS. *Food Res. 14:* 113-122. 1949.—Newly laid hens' eggs coated with thermoplastic films of chlorinated rubber, polyvinyl acetate, or polystyrene lose substantially less carbon dioxide and water during storage than untreated eggs. The ability of polystyrene and chlorinated rubber to preserve fresh eggs is improved by inclusion of either dibutyl phthalate or n-butyl stearate in the plastic solns. The preservative value of these plasticized resins is somewhat increased by small amts. of petrolatum and microcrystalline wax. The inclusion of cetyl pyridinium chloride, a mold inhibitor, does not decrease the sealing ability of these plastic coatings. Cracked eggs are as effectively sealed by plastic films as eggs with sound shells.—*W. D. Yushok.* (Biological Abstracts)

EFFECT OF HOLDING TIME AND TEMPERATURE BEFORE STORAGE ON QUALITY OF STORED EGGS. *Report of the Chief of the Bureau of Animal Industry Agricultural Research Administration, 1949,* pages 29-30.—In an attempt to find an explanation for variation in quality of stored eggs, temperatures of 41°, 59°, and 77° F. were used at Beltsville for holding eggs for periods up to 25 days. The eggs were then stored at 30° F. for 9 months. The effect of this "controlled mistreatment" before storage on the quality of the eggs after storage was surprisingly small. (Experiment Station Record)

FACTORS THAT AFFECT KEEPING QUALITY OF EGGS. *Report of the Chief of the Bureau of Animal Industry Agricultural Research Administration 1949,* page 26.—Eggs from one line have a type of thick albumen which slowly breaks down to thin albumen. This line has been called the "heat-resistant" line. Eggs from the other line are quite the reverse, the thick albumen rapidly deteriorating to thin albumen. In recent tests, eggs from both lines were kept at a temperature of 100° F. at a constant humidity for 14 days to test their resistance to heat. After this time the heat-resistant eggs had approximately 60 percent thick albumen, more than three times as much as the 18 percent remaining in the non-heat-resistant line.

Eggs from the heat-resistant line stored at a temperature at 30° F. for periods of 6 and 12 months were definitely superior to non-heat-resistant eggs and to eggs laid by unselected hens. All eggs were handled and stored under identical conditions. (Experiment Station Record)

FANCY TURKEY QUARTERS IDEAL FOR SMALL FAMILIES. *Indiana Sta. Bul. 537:* 2 October, 1949.—Turkey quarters sold during this study were competitively priced the first year and sales results were encouraging. Toward the end of the study, prices of quarters were high relative to other meats and greater sales resistance was met. Packaging increased costs about 5 cents per pound, but costs would have been less on a large volume basis.

Only high quality turkeys should be marketed as quarters.

Turkey quarters should be displayed in self-service frozen food cases for greatest sales.

The plain carton first used in Indianapolis had little sales appeal for shoppers. Definite resistance against handling this package appeared in trade channels because of its lack of appeal. Attractive red and black cartons and matching posters were designed to break down this trade resistance and to influence consumer purchases.

A price differential of 15 to 25 cents per pound is necessary to equalize sales of both light meat and dark meat quarters.

One chain store advertised turkey quarters frequently and obtained the most satisfactory sales results. A second chain store advertised turkey quarters only four times during the study; this store's sales results were discouragnig.

Consumers prefer to see the turkey meat before buying. "Plastic" bags were satisfactory on a semi-commercial basis.

Ninety-one percent of a sample of turkey quarter consumers liked them very well and 96 percent said they would buy again. (Experiment Station Record)

MEAT YIELD CALCULATED FROM LIVE WEIGHT OF CHICKENS, *Report of the Chief of the Bureau of Animal Industry, Agricultural Research Administration 1949*, page 29.—The Cornish gave a larger eviscerated carcass and more edible meat for each pound of live weight than the New Hampshire, Rhode Island Red, or the crossbred. (Experiment Station Record)

MANGEMENT

COTTIER, G. J. RAISING BROILERS ON USED LITTER. *Alabama Agricultural Experiment Station 58th and 59th Annual Reports, page 40.*—Broilers grown out on clean litter were slightly heavier at 10 to 11 weeks of age and were less infested with large round worms in the intestines than broilers produced on dirty litter. (Experiment Station Record)

S. S. DeFOREST, and HAROLD BEATY. KILOWATTS CUT POULTRY CHORES. *Iowa Farm Science, 4:* 13, 93, December, 1949.—Electrical poultry equipment used correctly can save you time, effort and money. (Experiment Station Record)

FRONDA, F. M., LEODEGARIO J. DEL ROSARIO, and LEOPOLDO S. CASTILLO. *University of the Philippines, College of Agriculture, College, Laguna.)* SUN PORCH FOR BROODING CHICKS. *Philippine Agriculturist 32:* 339-342.—The ground-run-reared chicks were heavier than those reared in the sun porch. There was no significant difference in mortality between the ground-run-brooded chicks among the S. C. White Leghorns. In the case of New Hampshires, however, the ground-run-brooded chicks had a significantly lower mortality than those brooded in the sun porch. The quality of the weanlings produced on the ground-run lots of both breeds was better than that of the sun porch lots.—*F. M. Fronda.*

GLAZENER, E. W., R. E. COMSTOCK, R. S. DEARSTYNE and C. H. BOSTIAN. ARE SECOND-YEAR HENS PROFITABLE? *Research and Farming, North Carolina VIII:* 11. January, 1950.—The data suggest that hatchability is about the same in the first and second year, but that egg production is from 4 to 8 per cent less, the second year. If second-year birds are used for breeders, select only those that had good hatchability and egg production, with few pauses and periods of broodiness the first year. It is probably not economical to use more than the top 25 per cent of the breeders the second year. (Experiment Station Record)

KEMPSTER, H. L. RELATION OF DATE OF HATCH TO EGG PRODUCTION. Missouri's Sixtieth Year of Agricultural Research, *Annual report for 1947-48, Bulletin 528; 42.* September, 1949.—It is apparent that early maturing breeds such as New Hampshires and White Leghorns may be hatched as late as April, and that the early hatched pullets are not handicapped so far as fall and winter egg production is concerned. (Experiment Station Record)

KEMPSTER, H. L., and J. C. WOOLEY. THE EFFECT OF ENVIRONMENT ON LAYING HENS. Missouri's Sixtieth Year of Agricultural Research, *Annual report for 1947-48, Bulletin, 528; 43.* September, 1949.—Three poultry houses were used in the work. (1) The 20 x 20 Missouri Poultry House characterized by having a straw loft and an open space which can be closed by use of a canvas curtain. The side walls are not insulated. (2) A 20 x 20 house with insulated walls and ceiling. This house also has an open front which is provided with a baffle which protects the front. (3) A 20 x 20 concrete block house with straw loft and an open front which is placed higher than in the other houses.

The egg production per bird for White Leghorn pullets from September 21 to February 28 for the three houses was 73, 79 and 78.6 eggs respectively. (Experiment Station Record)

MILBURY, A. T. HOW TO HANDLE HATCHING EGGS. A GUIDE FOR YOUR FLOCKOWNERS. *Hatchery and Feed, February, 1950, 24:* 74.—The egg cooling room temperature should be 55° to 65°F.; the humidity should be 75 to 90 percent, and not less than 75 percent.

The following is a table taken from the records of Nichols Poultry Farm, Inc., Kingston, N. H. They will show what poor egg holding costs the producer and the hatchery:

Case No. 1:
Humidity *under* 75%,
Temperature over 65°, Hatch 68%.
Humidity *over* 75%,
Temperature under 65°, Hatch 86%.

Case No. 2:
Humidity *under* 75%,
Temperature over 65°, Hatch 78%.
Humidity *over* 75%,
Temperature under 65°, Hatch 94%.

The above data represent a difference of 18 percent and 16 percent in hatchability, when eggs are packed and held properly.

On market eggs, C. O. Dossin, Penn State College, found the following:

Humidity over 75%,
Temperature under 65°—97.7% Fancies.
Temperature over 65°—92.5% Fancies.
Humidity under 75%,
Temperature under 65°—45.1% Fancies.
Temperature over 65°—27.0% Fancies.
(Experiment Station Record)

MILLIER, W. F. *(Cornell U., Ithaca, N. Y.)* HOW TO USE FAN VENTILATION. *Poultry Tribune 54:* 12, 30-32. 1948.—Descr. of outtake fan installed in a poultry house. Door behind fan is opened in warm weather to remove ceiling air. Fan duct extends to within 20 inches of floor to remove cold floor air. Sketches of intakes and outtakes are shown.—*F. P. Jeffrey.* (Biological Abstracts)

ALUMINUM HELPS IN POULTRY HOUSE INSULATION, *Extension Service News, College Park, Maryland, January 1950, XXXVII:* 5.—One of the first and simplest methods for reducing these heat losses is to use ventilator doors in the rear of the house. This means big doors which will permit a lot of breeze to cross the house, both at the ceiling level and down near bird level, to permit the escape of excess heat. It is probably safe to say that no poultry house in Maryland may be considered modern unless it gives adequate cross ventilation in summer.

A new material in poultry house construction, aluminum roofing offers another important method of keeping poultry houses comfortable during high summer temperatures. The aluminum reflects the heat and keeps the building cooler. It has also been found that one coat of aluminum paint applied to a black bituminous paper roof will reduce temperatures within the building. (Experiment Station Record)

BROODING WITH RADIANT HEAT, *Poultry Industry, 53:* 16. March, 1950.—It saves labor because there are no obstructions such as pipes or hovers or stoves in the pens to interfere with the cleaning and other work.

Less litter is required, as too much litter cuts off the heat. Most operators use about one-quarter inch of litter. Since the litter remains dry during the whole period of brooding, less labor is required in removing or adding litter.

Less coccidiosis is likely to appear since it is possible to keep the litter dry at all times.

Crowding is reduced to a minimum since there is even heat in all parts of the floor.

The cost of operation is likely to be less than with other methods of supplying heat.

Some of the disadvantages may be:

(1) Slightly higher cost of the installation in new buildings.

(2) Possible difficulty in controlling temperature with quick changes in the outside temperature, when the house is not properly insulated to modify these sudden changes on the inside of the house.

(3) The possibility of over-dryness in the brooding room, although observations have shown that thus far this has not been a problem with most installations. (Experiment Station Record)

EGGS OF LOW HATCHABILITY IDENTIFIED BY SPECIAL CANDLING, *Report of the Chief of the Bureau of Animal Industry Agricultural Research Administration 1949*, page 30.—A method was developed for identifying eggs of potentially low hatchability after 18 hours of incubation. Hatching eggs were incubated for 18 hours and, with the aid of a candler which was equipped with a blue-green filter, the fertile eggs were classified into 3 separate grades. (Experiment Station Record)

GREATER EGG PRODUCTION WITH BACTERICIDAL RADIATION, *1949 Report of the Chief of the Bureau of Plant Industry, Soils, and Agricultural Engineering, Agricultural Research Administration, USDA*, page 83.—Pullets receiving bactericidal (ultraviolet) radiation laid 8.6 percent more eggs in a 273-day period test at Beltsville than pullets receiving no ultraviolet radiation. They also exceeded in egg production pullets receiving radiation in the near ultraviolet (black light) and erythemal (middle ultraviolet) regions. These two lots produced about the same as pullets receiving no ultraviolet radiation at all. (Experiment Station Record)

GENERAL

De BEER, J. A. *(Coll. Agric., Glen, O. F. S.)* CENTRAL EGG-LAYING COMPETITION AT GLEN. *Farming in S. Africa. 23:* 337-344. 1948.—The rules, enrollment, and results of the 22d Open Competition and the 14th test of the Registered Breeders' Assoc. contests are presented. From the results of this past competition the author concludes that breeders must pay more attenion to the following: hens with strong constitutions; breeding of hens from parents with both high egg production and stamina; elimination of families in which cancer occurs; and egg size as well as strength of shell.—*A. L. Pope.* (Biological Abstracts)

Du PLESSIS, P. H. C. *(Natal Univ. Coll., Pietermaritzburg.)* THE INTERNATIONAL EGG-LAYING CHAMPION. *Farming in S. Africa 23:* 309-315. 1948.—After a survey of all previous egg-laying records throughout the world, the author declares a Black Australorp hen No. 215 of S. Africa the international egg-laying champion. She laid 354 grade A eggs and 1 grade B egg in 365 days. (An A egg weighs 2 oz. or more; a B egg less than 2 oz.) While other hens have laid more eggs, individual egg weight records were not kept. The author suggests that S. African contests should include progeny testing of champions as is done in the U.S.A.—*A. L. Pope* (Biological Abstracts)

HENDERSON, WILSON, and J. S. CARVER. *(Washington State Coll.)* POULTRY HUSBANDRY PRACTICES. *Poultry Sci. 28:* 317-319. 1949.—A course planned to meet the needs of future high school instructors in agriculture. A brief outline of assignments and the material presented at each period is given.—*Wilson Henderson.* (Biological Abstracts)

JULIAN, JOSE B. *(University of the Philippines, College of Agriculture, College, Laguna).* FACTORS IN THE PRODUCTION OF GREEN DUCKS. *Philippine Agriculturist 32:* 267-275. 1949.—A study to determine the factors in the cost of producing green ducks on a com-

mercial scale showed that of the total cost of production feed represented 72.5 per cent, labor 18.61 per cent, and stock 6.44 per cent. The remaining 2.45 per cent is distributed among the minor items of expense. The author reported also that the ideal time for raising green ducks seems to be during the later part of the rainy season and the early part of the dry season, when the weather is fairly cool and when there are no heavy rains and storms.—*F. M. Fronda.*

MORFORD, V. J., and A. T. ODEGAARD. PORTABLE AND PERMANENT. *Iowa Farm Science, 3:* 12. 1949.—This poultry range shelter features permanent structure in a portable type building. It's built with simple, rigid construction using casein glue at important joints. The use of knee braces or gussets to join rafters and studding eliminates cross bracing inside the shelter, allowing easy access to the inside. The complete rafter and stud assembly can be nailed and glued before putting it up. (Experiment Station Record)

NORDSKOG, A. W., and S. LEE CRUMP. *(Iowa State Coll., Ames.)* SYSTEMATIC AND RANDOM SAMPLING FOR ESTIMATING EGG PRODUCTION IN POULTRY. *Biometrics 4:* 223-233. 1948.—100 first-year egg production records were studied using 3 methods of incomplete trapnesting (sampling). (1) interval-day, each trapnest day spaced at regular intervals throughout the mo.; (2) consecutive-day, trapnest days taken consecutively; (3) random-day trapnesting. Differences in accuracy among 3 methods were small. Interval-day may be slightly more accurate when groups of birds to be compared are trapnested on different days, but when trapnesting is conducted on the same days, consecutive-day sampling is slightly more accurate. The standard error of the difference of 2 groups of 20 birds is about 11.7 eggs per hen per yr. under complete trapnesting, increasing by 0.4 egg when trapnesting is reduced to a half-time basis and by 1.5 eggs when reduced to 1/7 of the time. Accuracy lost by trapnesting 14 days/mo. could be recovered by increasing group size only 7%, while that for trapnesting only 4 days/mo. by increasing group size 25%.—*F. C. W. Olson.* (Biological Abstracts)

HATCHABILITY OF EGGS OF BROAD BREASTED BRONZE AND BELTSVILLE SMALL WHITE TURKEYS, *Report of the Chief of the Bureau of Animal Industry Agricultural Research Administration 1949,* pages 27-28.—Fertility of eggs from the purebred matings was quite satisfactory, being 94.7 percent for the Beltsville Small Whites and 88.6 percent for the Broad Brested Bronze. It was reduced to 83.1 percent for the mating of bronze males with white females and to 68.8 percent for the reciprocal cross. (Experiment Station Record)

Note:

The Experiment Station Record, published by the Office of Experiment Stations, United States Department of Agriculture, was discontinued as a publication several years ago. References to "Experiment Station Record" in some of the items of this abstract material, therefore, refer not to the publication of this name but to the records kept by the Office of Experiment Stations.

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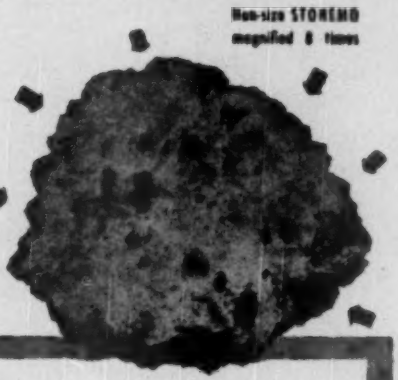

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